OMRON

RFID System

V680 Series

User's Manual

FL Remote ID

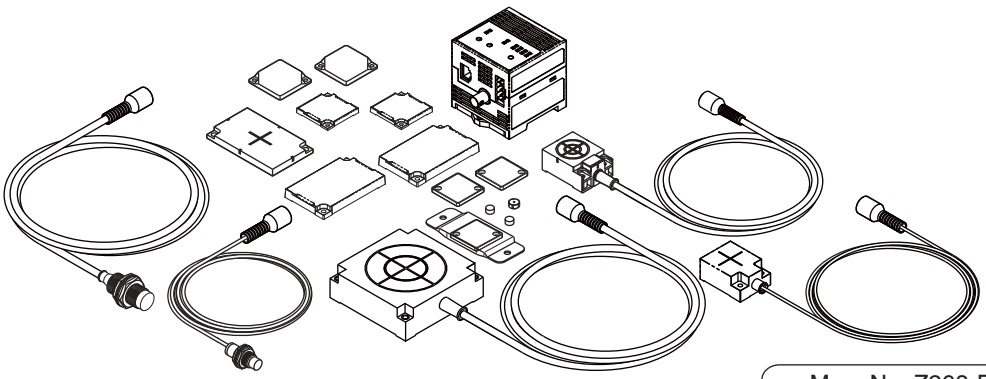
V680-HAM42-FRT

Antenna

V680-HS51
V680-HS52
V680-HS63
V680-HS63-SP
V680-HS65

RF Tag

V680-D1KP52MT
V680-D1KP53M
V680-D1KP66T/D1KP66MT
V680-D1KP66T-SP
V680-D2KF52M
V680-D8KF67/-D8KF67M
V680-D8KF68/-D32KF68
V680S-D2KF67/-D2KF67M
V680S-D2KF68/-D2KF68M
V680S-D8KF67/-D8KF67M
V680S-D8KF68/-D8KF68M



Man. No. Z268-E1-06

Introduction

Thank you for purchasing a V680/V680S-series RFID System. This manual describes the functions, performance, and application methods needed for optimum use of the V680/V680S-series RFID System.

Please observe the following items when using the RFID System.

- Allow the RFID System to be installed and operated only by qualified specialist with a sufficient knowledge of electrical systems.
- Read and understand this manual before attempting to use the RFID System and use the RFID System correctly.
- Keep this manual in a safe and accessible location so that it is available for reference when required.

Introduction	READ AND UNDERSTAND THIS DOCUMENT
SECTION 1	Product Overview
SECTION 2	Installation, Connections, and Wiring
SECTION 3	Preparations for Communications
SECTION 4	Functions
SECTION 5	Communications
SECTION 6	Troubleshooting
SECTION 7	Appendices

RFID System

V680-HAM42-FRT	FL Remote ID
V680-HS51	Antenna
V680-HS52	Antenna
V680-HS63	Antenna
V680-HS63-SP	Antenna
V680-HS65	Antenna
V680-D1KP52MT	RF Tag
V680-D1KP53M	RF Tag
V680-D1KP66T/-D1KP66MT	RF Tag
V680-D1KP66T-SP	RF Tag
V680-D2KF52M	RF Tag
V680-D8KF67/-D8KF67M	RF Tag
V680-D8KF68/-D32KF68	RF Tag
V680S-D2KF67/-D2KF67M	RF Tag
V680S-D2KF68/-D2KF68M	RF Tag
V680S-D8KF67/-D8KF67M	RF Tag
V680S-D8KF68/-D8KF68M	RF Tag

User's Manual

READ AND UNDERSTAND THIS DOCUMENT

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

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Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

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Safety Precautions

● **Alert Symbols for Safe Use**

The following symbols are used in this manual to indicate precautions that must be observed to ensure safe use of the V680-HAM42-FRT/V680 Series Antennas/V680 Series RF Tags. The precautions provided here contain important safety information. Be sure to observe these precautions.

The following signal words are used in this manual.

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally, there may be significant property damage.

● **Meanings of Alert Symbols**

	Indicates general prohibitions for which there is no specific symbol.

● **Warning**

⚠WARNING

This Product is not designed to be used either directly or indirectly in applications that detect human presence for the purpose of maintaining safety. Do not use this Product as a sensing device for protecting human lives.

Precautions for Safe Use

Be sure to observe the following precautions to ensure safe use of the Products.

1. Do not use the Products in environments with flammable, explosive, or corrosive gases.
2. Do not attempt to disassemble, repair, or modify any Product.
3. Tighten mounting screws securely.
4. Be sure to use crimp terminals of the specified size for wiring.
5. If any cable has a locking mechanism, make sure that it has been locked before using the cable.
6. Make sure the power supplied by the DC power supply unit is within the rated power supply voltage (24 VDC +10%/−15%) before using the Product.
7. Do not connect the power supply in reverse.
8. Do not allow water or pieces of wire to enter from openings in the case. Doing so may cause fire or electric shock.
9. Turn OFF the FL Remote ID power before attaching or removing the Read/Write Antenna.
10. If an error is detected in any Product, immediately stop operation and turn OFF the power supply. Consult with an OMRON representative.
11. Dispose of the Products as industrial waste.
12. Do not touch the product immediately after usage at high temperatures. Doing so may occasionally result in burning.
13. If multiple Antennas are mounted near each other, communications performance may decrease due to mutual interference. Refer to *Mutual Interference between Antennas (Reference)* and check to make sure there is no mutual interference.
14. Provide sufficient ventilation space.
15. Do not install the Products near any equipment that generates a large amount of heat (such as heaters, transformers, and large-capacity resistors).
16. Using thinner, benzene, acetone, or kerosene for cleaning may affect the resin parts and the surface of the case. For detail, refer *Chemical Resistance of the Antennas and RF Tags186* and do not use chemicals that affect the resin parts and the surface of the case.
17. Observe all warnings and precautions given in the body of this manual.

Precautions for Correct Use

Always observe the following precautions to prevent operation failures, malfunctions, and adverse effects on performance and equipment.

1. Installation Environment

Do not use the Products in the following locations.

- Locations exposed to corrosive gases, dust, metallic powder, or salts
- Locations not within the specified operating temperature range
- Locations subject to rapid changes in temperature or condensation
- Locations not within the specified humidity range
- Locations subject to direct vibration or shock outside the specified ranges
- Locations subject to spray of water, oil, or chemicals

2. Installation

- The Products communicate with RF Tags using the 13.56-MHz frequency band. Some motors, inverters, and switching power supplies generate noise that can affect communications with the RF Tags and cause errors. If such devices are located near the RF Tags, always test operation in advance to confirm whether the system will be affected.
- Observe the following precautions to minimize the effects of normal noise.
  (1)Ground all metal objects in the vicinity of the Products to 100 Ω or less.
  (2)Do not use the Products near high-voltage or high-current lines.
- The communications range is adversely affected if there is any metal material around the RF Tag.
- Transmission will not be possible if the front and back panels are mistakenly reversed and the Unit is mounted to a metallic surface.
  V680-D1KP66MT
  V680-D8KF67M
  V680S-D2KF67M
  V680S-D2KF68M
  V680S-D8KF67M
  V680S-D8KF68M

- The transmission distance will be reduced when the Unit is not mounted to a metallic surface. mounted to a metallic surface.
  V680-D1KP66MT
  V680-D8KF67M
  V680S-D2KF67M
  V680S-D2KF68M
  V680S-D8KF67M
  V680S-D8KF68M
- The maximum communications range can be obtained when the Antenna faces the RF tag directly. When the RF tag is installed at a tilt, the communications range is reduced. Consider the effect of the RF tag at tilt when installing the RF Tag.
- Provide the mounting distances between plural RF tags to prevent them from malfunctions due to mutual interference.
- If the central axis of an antenna and RF tag shifts, a communications range will fall.

3. Storage

Do not store the Products in the following locations.

- Locations exposed to corrosive gases, dust, metallic powder, or salts
- Locations not within the specified storage temperature range
- Locations subject to rapid changes in temperature or condensation
- Locations not within the specified storage humidity range
- Locations subject to direct vibration or shock outside the specified ranges
- Locations subject to spray of water, oil, or chemicals

Meanings of Symbols

Indicates particularly important points related to a function, including precautions and application advice.

Indicates page numbers containing relevant information.

Indicates reference to helpful information and explanations for difficult terminology.

MEMO

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Product Overview

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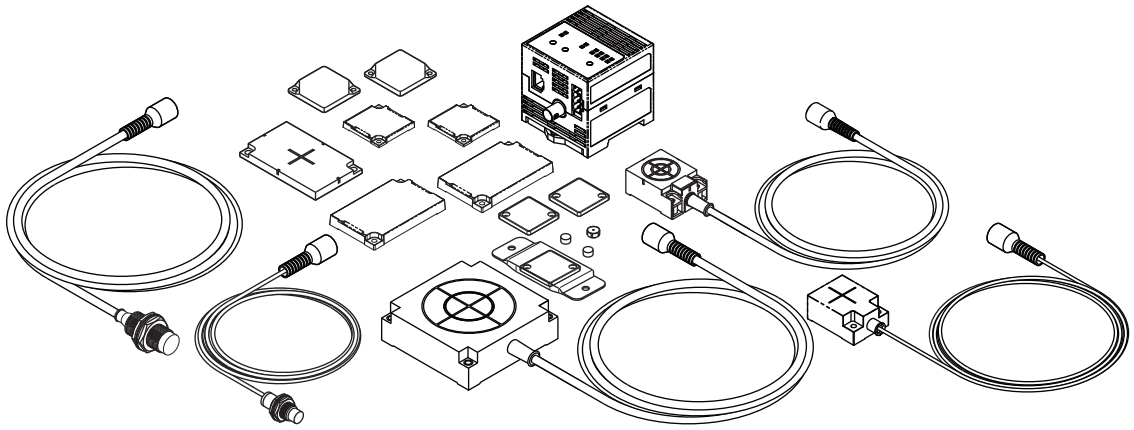
Features

The V680-series RFID System uses electromagnetic induction and supports the ISO/IEC18000-3 (ISO/IEC15693) RFID system international standards.



■ Highly Reliable RF Tag Communications

The V680 features highly reliable RF Tag communications developed through the V600-series RFID Systems, making it easy to use on-site.

■ Compatible with FL Remote

The FL Remote ID is compatible with the FL Remote system, a remote I/O system based on FL-net (OPCN-2). It can be easily installed using LAN cables and easily programmed through I/O controls.

■ Compact Design with an Internal Amplifier

With a compact size of 65 × 65 × 65 (W × H × D) mm, the FL Remote ID requires less space for installation.

■ Antennas and RF Tags with Superior Environmental Resistance

Fluororesin has superior environmental resistance, and is used for the external coatings of the Antenna case, Antenna cable, and the RF Tags.

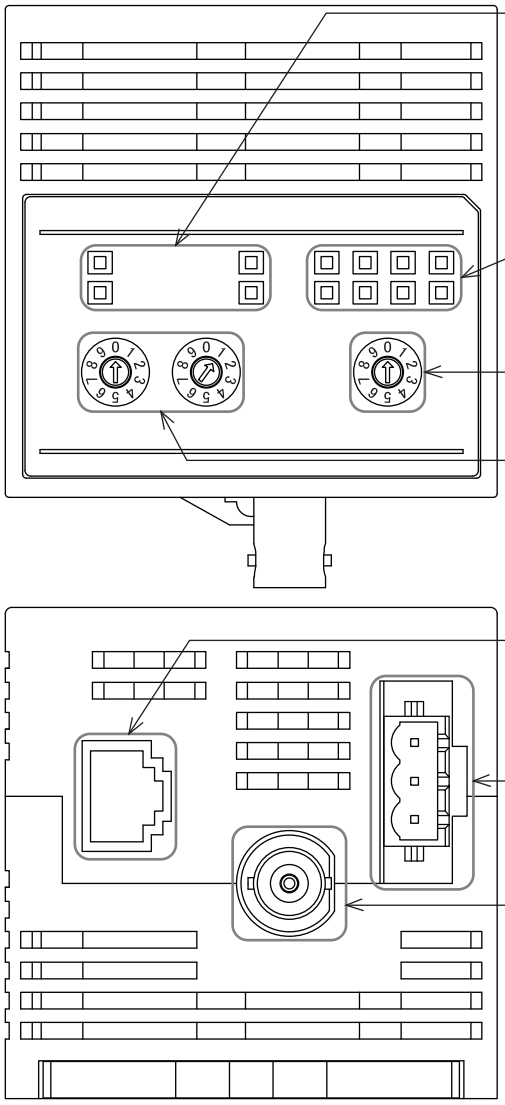
■ RF Tag Service Life Warning Management

The EEPROM has a service life of 100,000 data write operations. With the FL Remote ID, the service life for data write operations of RF Tags can be managed automatically. The total number of data write operations to each block of the RF Tag is counted and saved to a special area of each RF Tag. Warning is output if the number of data write operations exceeds 100,000.

Note: A memory capacity of 992 bytes is required to enable RF Tag service life warning management.

Part Names and Functions

Part Names



■ Operation Indicators
DEV: Unit status (green/red)
RMT: FL Remote network status (green/red)
T/R: RF Tag communications status (yellow)
NORMAL/ERROR: FL Remote ID operation result (green/red)

■ Data Display
Data display (green)
Error code display (red)

■ Mode Switch
FL Remote ID operation mode setting switch

■ Node Address Switch
Node Address Switches (01 to 64)

■ FL Remote Connector
Connects to FL Remote Master Unit

■ Power Supply Terminals
Connect to 24-VDC power.
Recommended Power Supply: S8VS-03024 (OMRON)

■ Antenna Connector
Connects to V680 Series Antenna

■ Operation Indicators

▪ DEV (Device Status)

The DEV indicator displays the Unit status.

Status		Definition
	Lit green	Normal
	Lit red	Fatal error
	Flashing red	Non-fatal error
	Not lit	No power

▪ RMT (Remote Status)

The RMT indicator displays the FL Remote network status.

Status		Definition
	Lit green	Adding link/Participating in remote communications
	Flashing green	Adding link/Leaving remote communications
	Flashing green and red	Adding link/Remote classification error or setting error
	Lit red	Duplicate node address or duplicate common address
	Flashing red	Withdrawn from link
	Not lit	Not linked.

▪ T/R

The TR indicator displays the RF Tag communications status.

Status		Definition
	Lit yellow	RF Tag is communicating
	Not lit	Standby

▪ NORMAL/ERROR

Status		Definition
	Lit green	Normal end
	Lit red	Error end
	Not lit	Standby

■ Data Display and Error Code Display

The Data Display shows the first byte of data that was read or written when communications ends normally. It displays the error code if communications ends in an error.

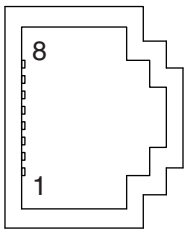
Status		Definition
	Lit green	Data displayed.
	Lit red	System error displayed.
	Flashing red	Error code displayed.
	Not lit	Display turned OFF.

CHECK!

For details, refer to the *RFID-related Errors*.
p.72

■ FL Remote Connector Port

This connector connects the FL Remote to the Master Unit.

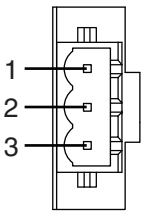


Pin No.	Name	Description	I/O
1	TX_D1+	Transmitted data +	Output
2	TX_D1–	Transmitted data –	Output
3	RX_D2+	Received data +	Input
4	---		---
5	---		---
6	RX_D2–	Received data –	Input
7	---		---
8	---		---
Hood	GR	Internal functional ground	---

■ Power Supply Terminals

The power supply terminals supply 24-VDC power using the included connector.

Included connector model: FKC2.5/3-ST-5.08-RF (Phoenix Contact)

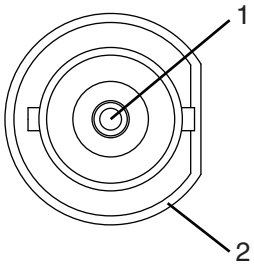


Pin No.	Name	Description	I/O
1	24V	24V	---
2	GND	GND	---
3	GR	Functional ground (Ground to 100 Ω or less.)	---

Use the recommended OMRON Power Supply, the S8VS-03024.

■ Antenna Connector Port

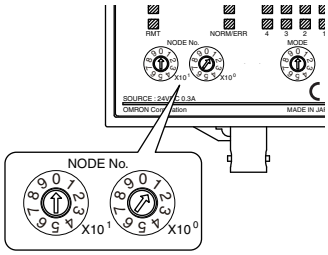
Connects the V680 Series Antenna.



Pin No.	Name	Description	I/O
1	S	Signal line	---
2	GND	Analog ground	---

■ Node Address Switches

The node address switches set the FL Remote Node Address. This node address is used as the right-most part of the IP address (e.g., xx of 192.168.250.xx).



Item	Description
Setting method	Two-digit decimal number The left rotary switch sets the 10s digit, and the right rotary switch set the 1s digit.
Setting range	01 to 64 The default setting is 01.

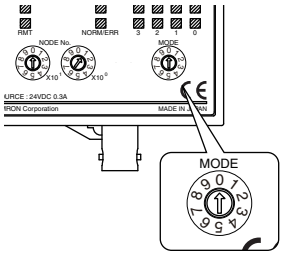
CHECK!

An address error will occur if "00" or "65" to "99" are set.

Turn the power OFF before setting the node address switches. The node address that is set when the power is turned ON will be valid.

■ Mode Switch

The mode switch sets the FL Remote ID operation mode.



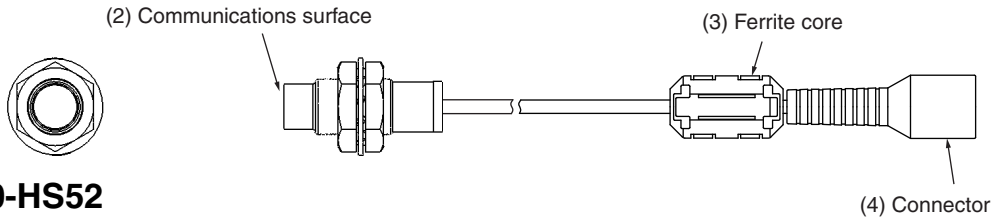
No.	Item	Description
0	Trigger	The input signal triggers communications and outputs the result.
1	Auto mode	Communications are repeatedly executed and the results are output.
2	Test mode	Operation can be checked while disconnected from the Master Unit by reading 4 bytes from address 00.
3	Noise level measure-ment mode	The noise conditions around the Antenna can be measured without connecting to the Master Unit.
4	E-paper label mode	For e-paper label developed by TOPPAN FORMS co.,ltd. the data can be read from and written to displayed information can be rewritten.
Other	-	(A mode setting error will occur if any other settings are made.)

CHECK!

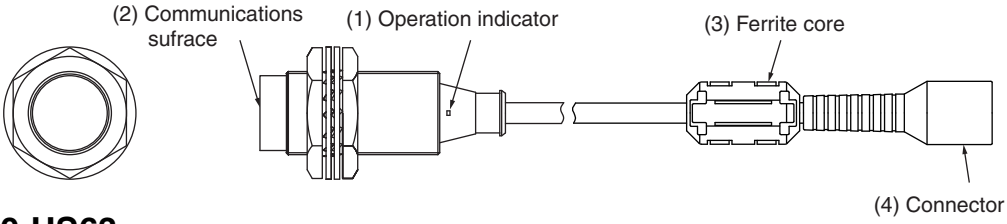
Turn the power OFF before setting the mode switch. The mode that is set when the power is turned ON will be valid.

Antennas

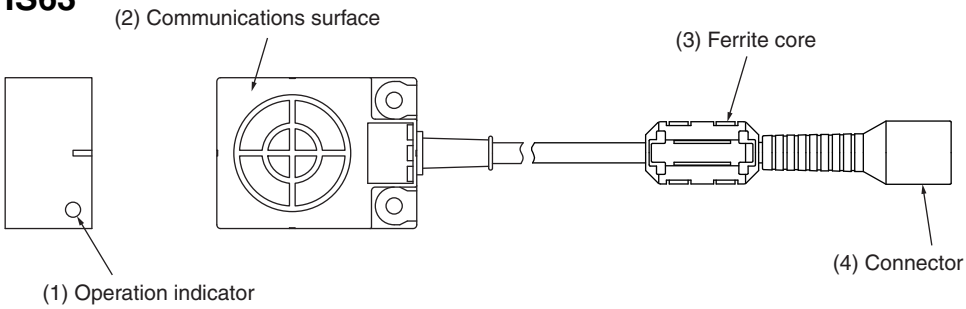
■ V680-HS51



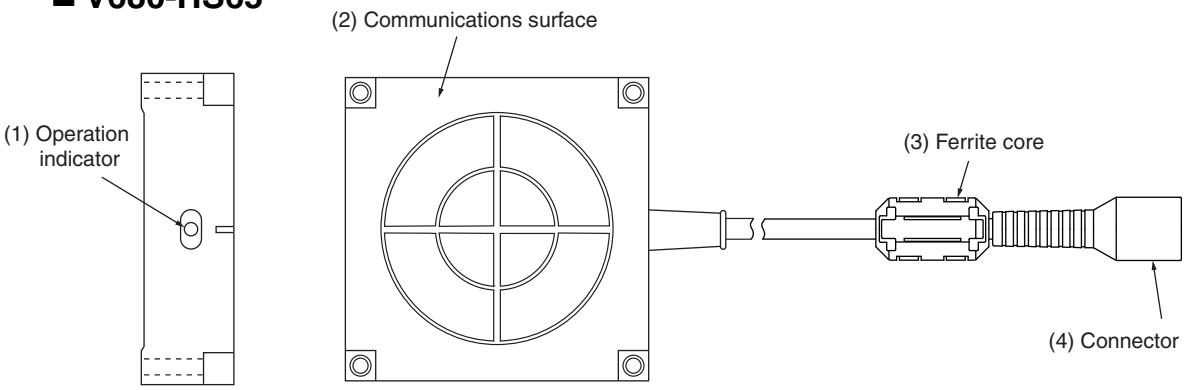
■ V680-HS52



■ V680-HS63



■ V680-HS65



No.	Name	Description
1	Operation indicator	Lights when a signal is transmitted.
2	Communications surface	Mounted facing the RF Tags.
3	Ferrite core	
4	Connector	Connects to the FL Remote ID.

RF Tags

■ V680-D1KP52MT/-D2KF52M

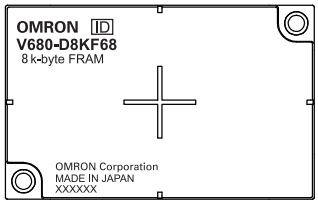
■ V680-D1KP53M

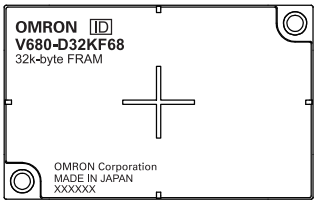
■ V680-D1KP66T/-D1KP66MT

■ V680-D1KP66T-SP

■ V680-D8KF67/-D8KF67M

■ V680-D8KF68/-D32KF68



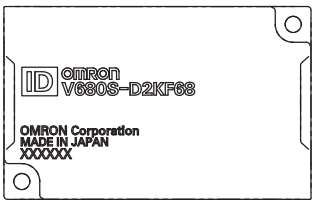


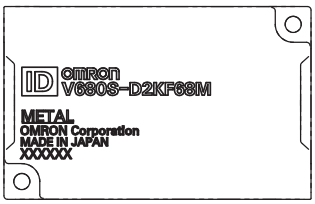
The FL Remote ID communications with the RF Tags through the Antenna to read and write data in the internal memory of the RF Tags.

The printed side is the communications surface. Mount the RF Tags with the communications surfaces facing the Antenna.

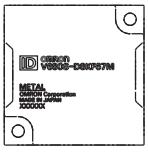
■ V680S-D2KF67/-D2KF67M

■ V680S-D2KF68/-D2KF68M

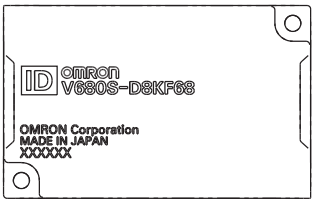


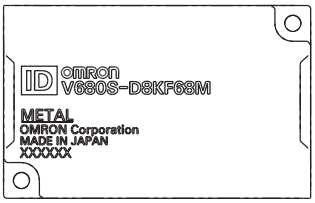


■ V680S-D8KF67/-D8KF67M



■ V680S-D8KF68/-D8KF68M



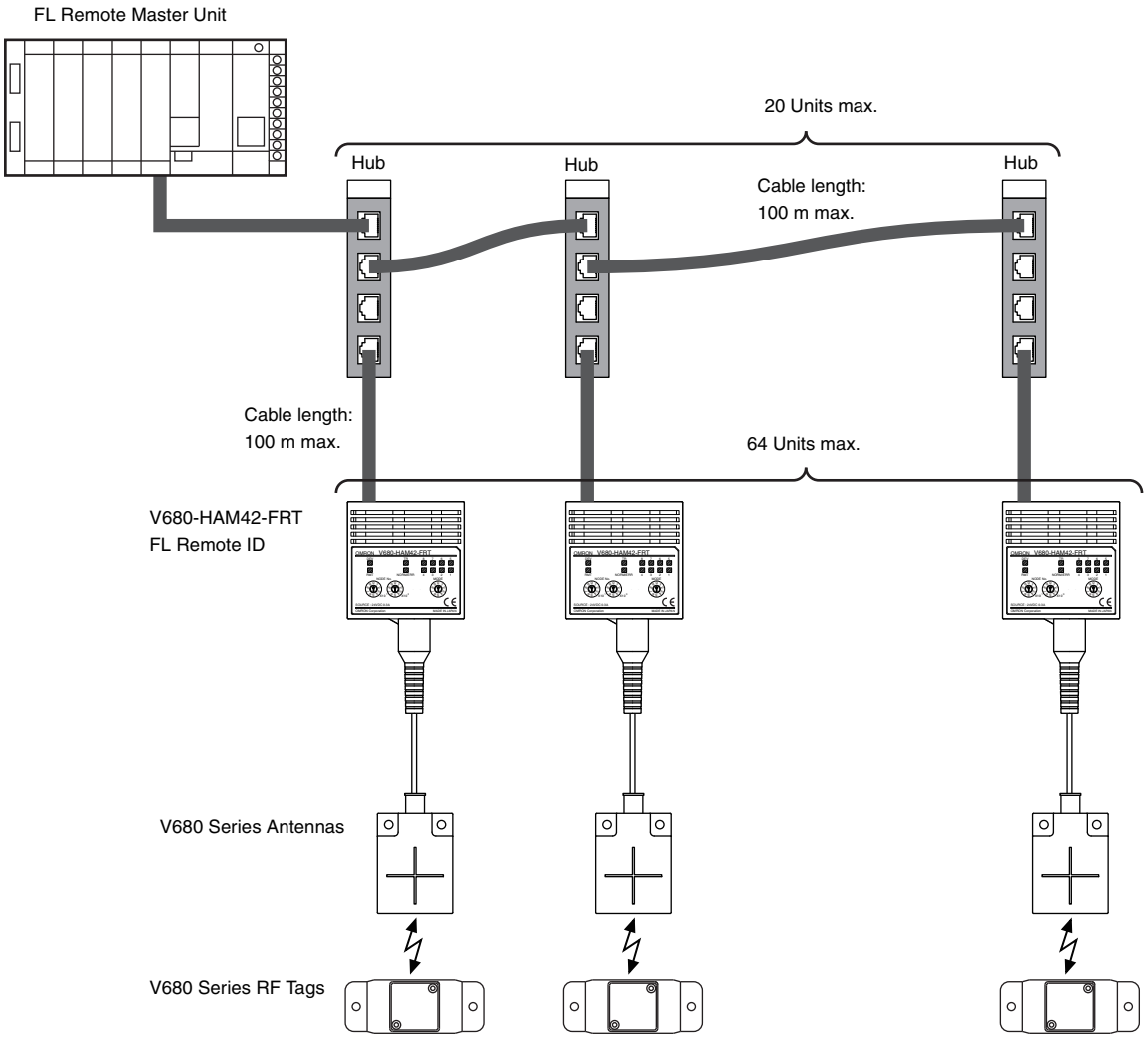


The FL Remote ID communications with the RF Tags through the Antenna to read and write data in the internal memory of the RF Tags.

The printed side is the communications surface. Mount the RF Tags with the communications surfaces facing the Antenna.

System Configuration 1

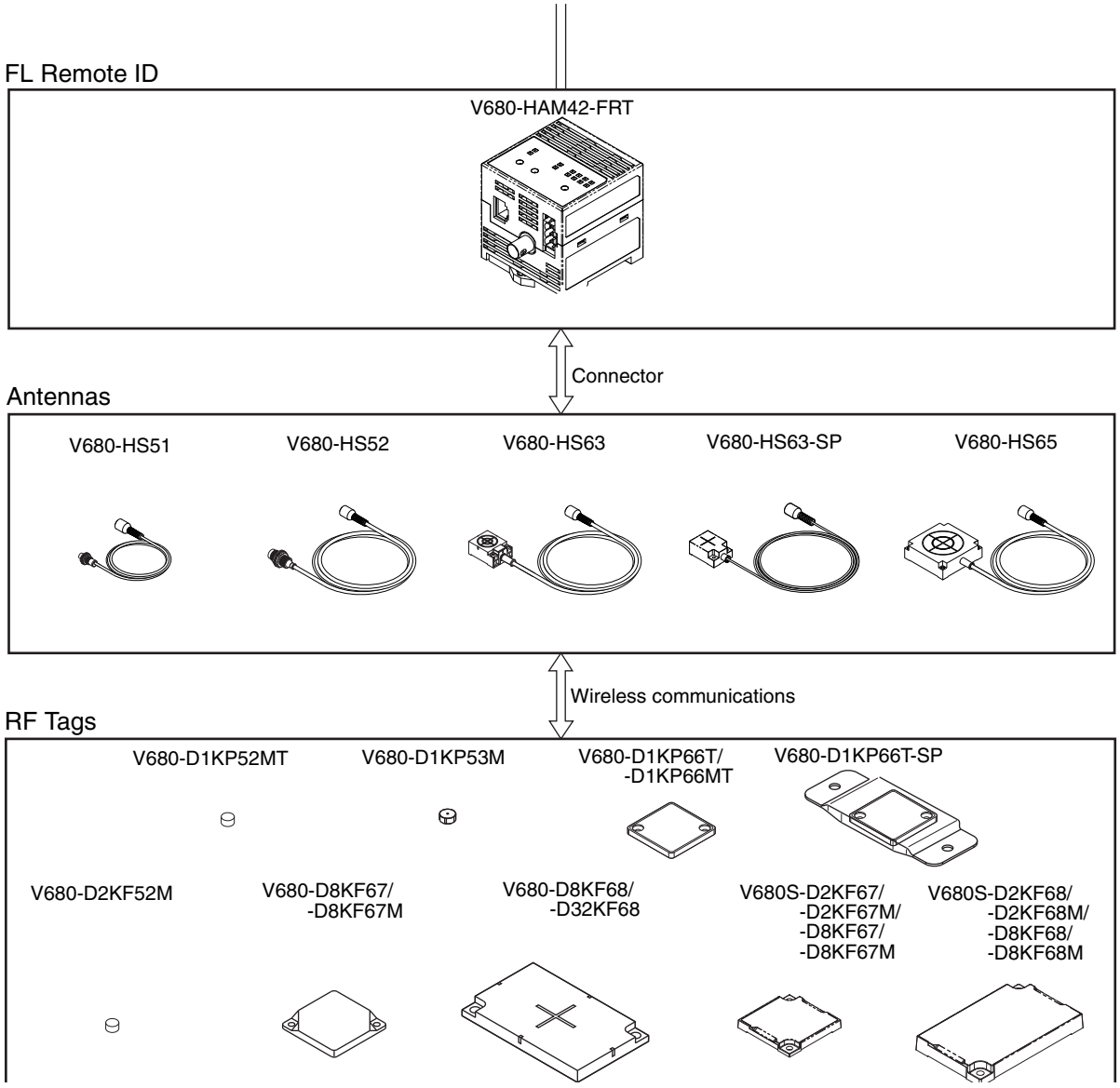
The system configuration is shown in the following figure.



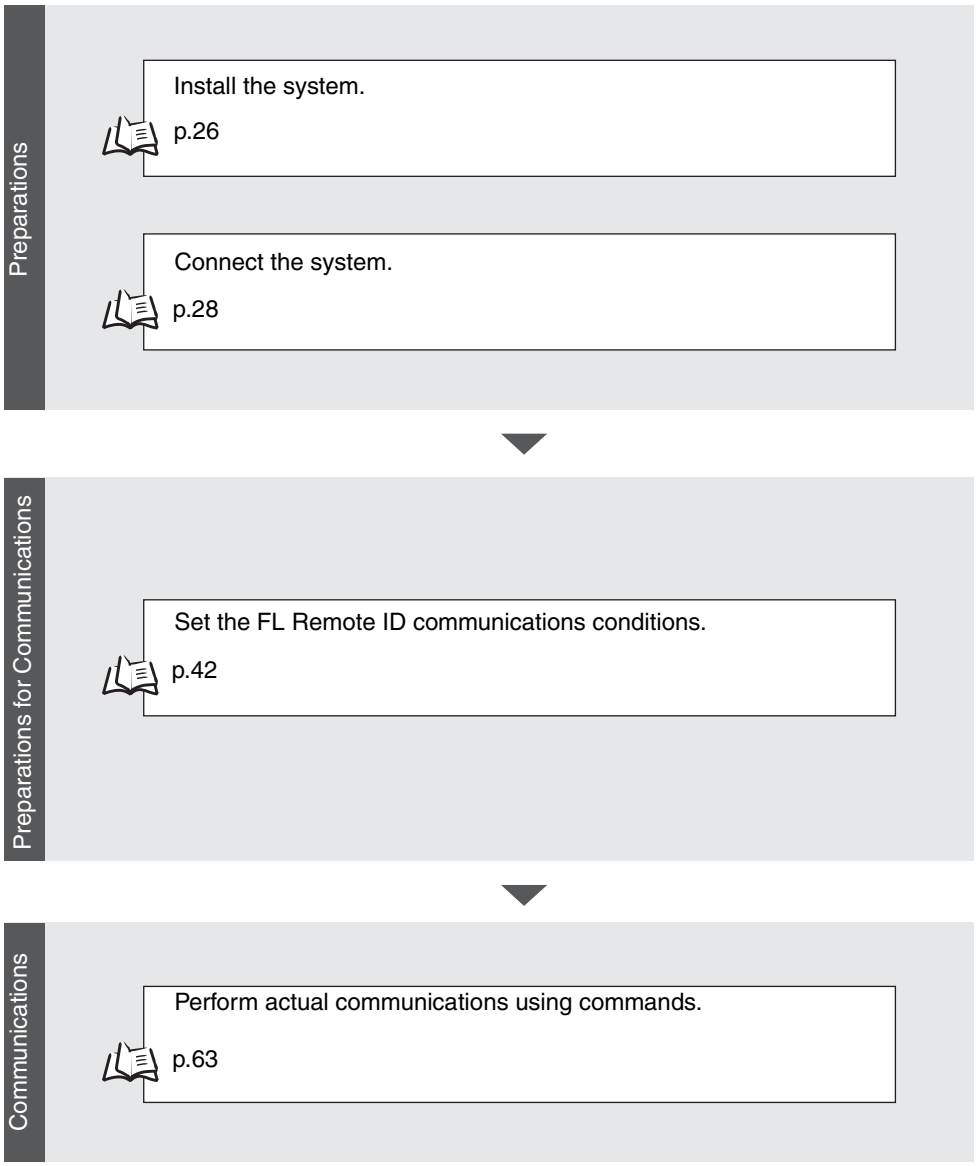
■ Configuration Description

Name	Description
FL Remote Master	Use a JTEKT PLC that is compatible with the FL Remote for the FL Remote Master. Also use a programming tool that is compatible with the FL Remote Master. Contact JTEKT for product details.
Hub	Use the JTEKT FE-SWH05/08.
Cable	Use the communications cable for FL Remote (category 5 or higher, with shield). Use straight cables between Hubs and FL Remote IDs. Use a cross cable when connecting the FL Remote Master and FL Remote ID directly.
FL Remote ID	Up to 64 FL Remote ID Units can be connected. The V680 Series Antenna can be connected to communicate with V680 Series RF Tags. Before use, check the restrictions on FL Remote Master Unit.

System Configuration 2



Application Flowchart



MEMO

SECTION 2
Installation, Connections, and Wiring

FL Remote ID	26
Installing Antennas	31
Installing RF Tags	35

FL Remote ID

Installation

To ensure full functionality of the V680-HAM42-FRT FL Remote ID, follow the instructions provided in this section for installation.

■ Installation Site

Do not install the ID Controller in the following locations.

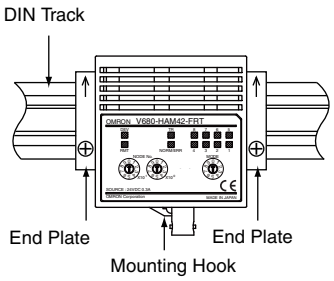
- Locations exposed to ambient temperatures that are not between −10 and 55°C or where there are radical temperature changes resulting in condensation
- Locations exposed to humidity that is not between 25% and 85%
- Locations subject to corrosive gas, flammable gas, dust, salt, or metal powder
- Locations that will expose the ID Controller to direct vibration or shock
- Locations exposed to direct sunlight
- Locations exposed to spray of water, oil, or chemicals
- Locations more than 2,000 m above sea level

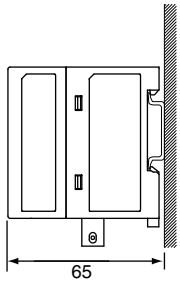
■ Mounting in a Panel

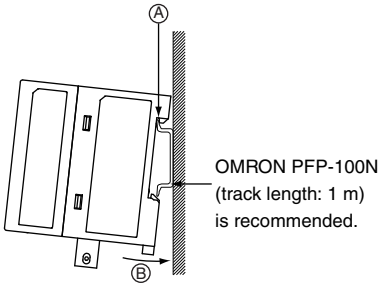
The FL Remote ID Unit can be used at an ambient temperature range of −10 to 55°C. Be sure to observe the following precautions.

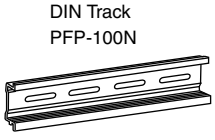
- Make sure that the Unit is provided with sufficient ventilation space.
- Do not install the Unit close to heaters, transformers, or large-capacity resistors that radiate excessive heat.

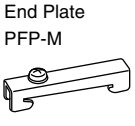
■ Installation Method











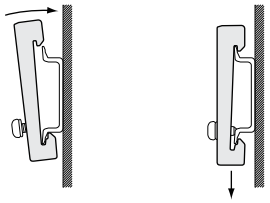
1. First hook the FL Remote ID Unit to part A, then press it in direction B to mount it to the DIN Track.
2. To disconnect the FL Remote ID Unit from the DIN Track, pull the mounting hook downwards, and then lift the Unit upwards.

CHECK!

Attaching the End Plates

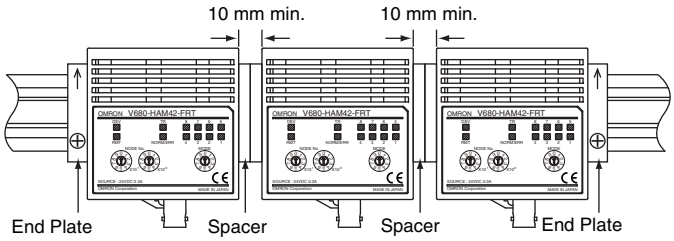
To mount an End Plate easily, first hook the bottom of the End Plate and then hook the top on the DIN Track, pull the End Plate downwards and tighten the screw.

Recommended tightening torque: 1.2 N·m.

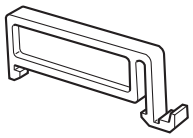


■ Mounting Interval

The V680-HAM42-FRT FL Remote ID Units will generate heat if they are mounted side-by-side. Leave space between Units of at least 10 mm.



Use at least 2 OMRON DIN Track Spacers. (Each Spacer is 5 mm wide.)



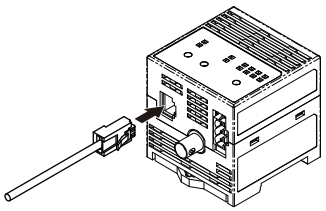
Spacer
PFP-S

Connection and Wiring

■ FL Remote Connector

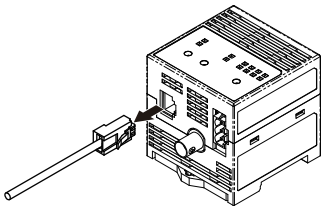
▪ Installation

Hold the connector part of the cable and insert it into the FL Remote Port.



▪ Removal

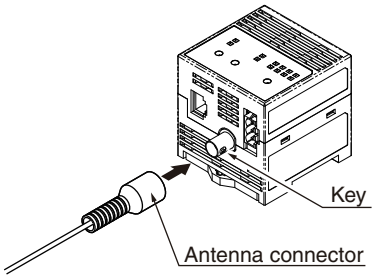
Unlock the connector and pull it out.



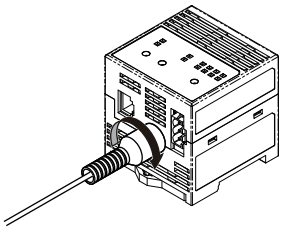
■ Antenna Connector

▪ Mounting the Antenna

1. Hold the connector part of the Antenna and insert it into the Antenna port while matching the key on the Unit with the groove on the connector.

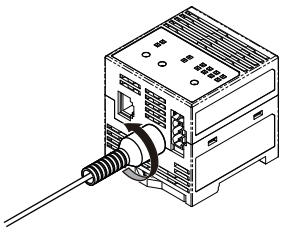


2. Turn the connector clockwise to lock it in place.

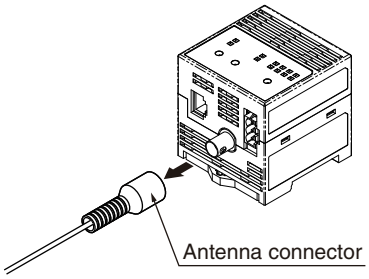


▪ Removing the Antenna

1. Turn the connector in counterclockwise to release the lock.



2. Pull the connector straight out of the port.



CHECK!

The connector cannot be removed without turning it to release the lock. If the cable is pulled without releasing the lock, it may cause the cable or wires to break. Make sure that the lock is released before pulling out the connector.

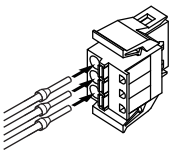
■ Power Supply Connector

Use the connector that comes with the Unit. You must provide the connecting cable.

		Brand	Model	Note
Cable	Power line	---	---	1.0 mm^2 (equivalent to AWG18)
Connector		Phoenix Contact	FKC2.5/3-ST-5.08-RF	---
Crimp Terminal	When one line is connected to one terminal		AI1-10RD	---
	When two lines are connected to one terminal		AI-TWIN2×1-10RD	---
Crimping Tool			CRIMPFOX UD6	---

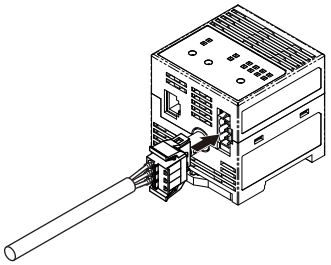
1. Attach the crimp terminals to the sections of the cable where the sheath has been stripped.

2. Make sure the connector is facing the right direction and insert each crimp terminal into the correct connector hole.



3. Once all of the cables have been connected to the connector, attach the connector to the FL Remote ID Unit.

Align the cable connector with the connector on the FL Remote ID Unit. Hold the connector body and push the connector firmly into place.



CHECK! Removing the Connector

Remove the connector by pressing in on the lock on the cable connector to release the lock and pulling the connector straight out. If the connector is difficult to remove, press on the FL Remote ID Unit while pulling on the connector.

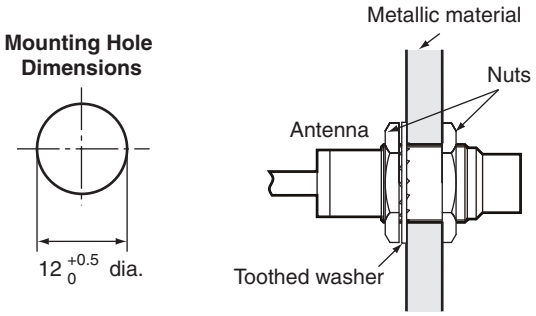
CHECK! Do not connect cables to the connector after attaching the connector to the FL Remote ID Unit.

CHECK! Use the recommended Power Supply (S8VS-03024, OMRON).

Installing Antennas

V680-HS51

Install the Antenna using the nuts and toothed washer that are provided on both sides of the mounting material, as shown in the diagram below.



CHECK! Securely tighten the screws to a torque of 6 N·m.

V680-HS52

Install the Antenna using the nuts and toothed washer that are provided on both sides of the mounting material, as shown in the diagram below.

CHECK! When the Antenna is mounted to a metallic material, the communications range will be reduced by approximately 10% compared with mounting to a non-metallic material. For details on the effect of metal surrounding the Antenna, refer to *Effect of Surrounding Metals on the Antenna (Reference)*.

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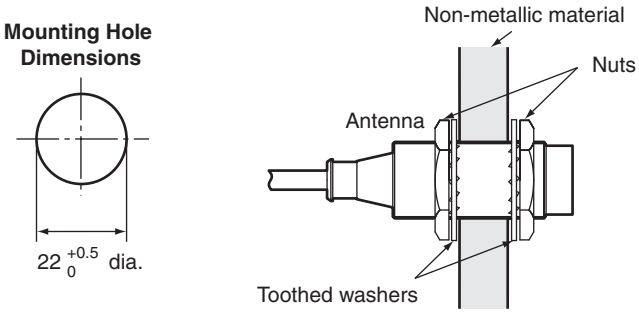
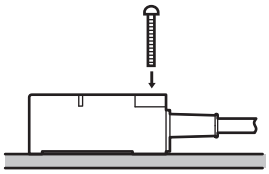
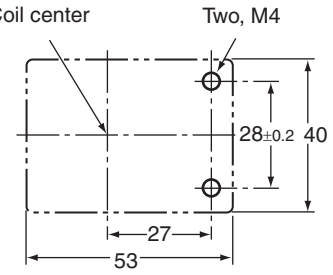


CHECK! Securely tighten the screws to a torque of 40 N·m.

V680-HS63

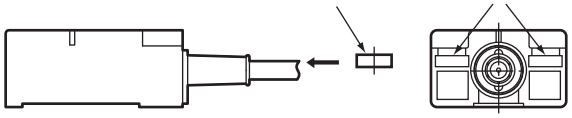
■ Installation from the Front

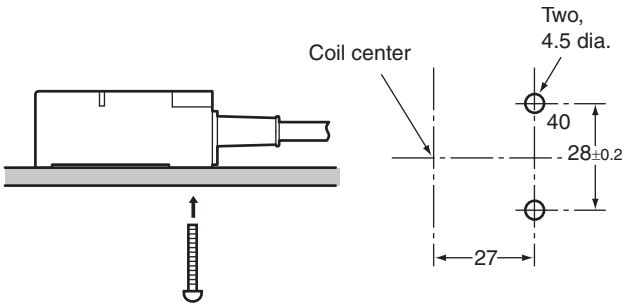




■ Installation from the Back

Insert the nuts that come with the Antenna into sections A.





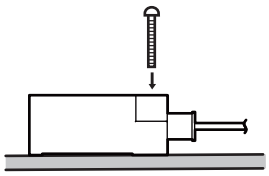
CHECK!

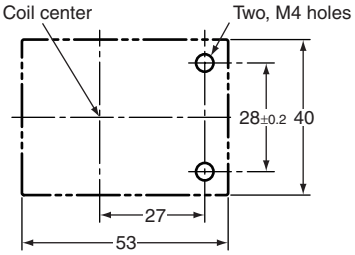
Securely tighten screws to a torque of 1.2 N·m.

V680-HS63-SP

■ Installation from the Front

Secure the Unit with M4 screws and washers.

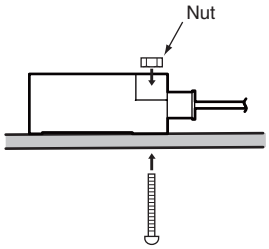


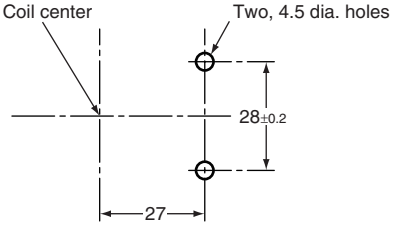


Installation from the Back

■ Installation from the Back

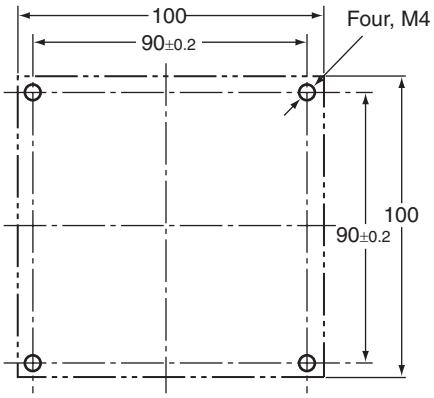
Secure the Unit with M4 screws and washers.





Securely tighten screws to a maximum torque of 1.2 N·m.

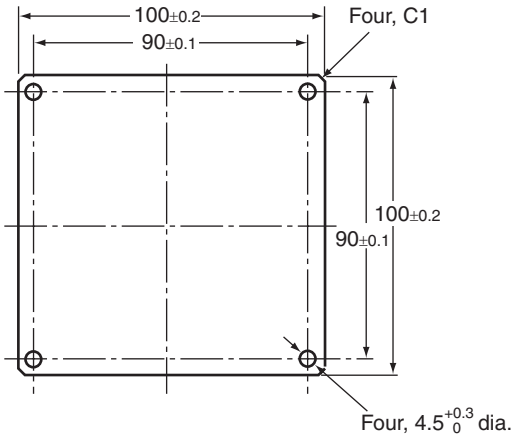
V680-HS65



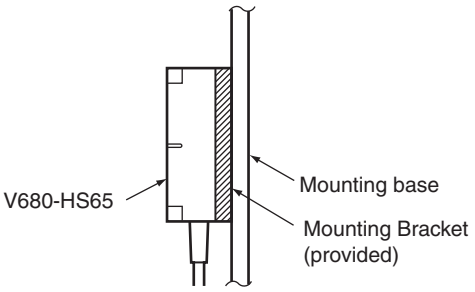
Use M4 screws and spring washers (in four places) for Antenna installation.

CHECK! Securely tighten screws to a torque of 0.7 to 1.2 N·m.

■ Mounting Bracket Dimensions (Provided Only with the V680-HS65)



Note: When installing the Antenna, mount it on the enclosed Mounting Bracket. The Mounting Bracket is not necessary, however, if the Antenna is mounted on a metal base that is larger than the Antenna (100 × 100 mm).



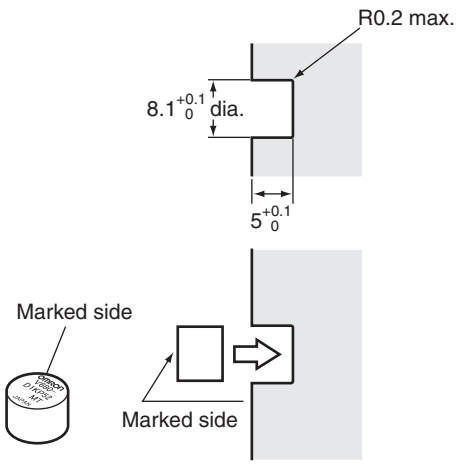
Installing RF Tags

V680-D1KP52MT

■ RF Tag Installation

Mount RF Tags as shown in the diagram on the right. The epoxy adhesives listed in the following table are recommended for the given temperature ranges.

Ambient operating temperature	Product name	Manufacturer
−40 to 70°C	Two-part Epoxy-compound Resin: TB2001 (main agent)/TB2105C (curing agent)	Three Bond Co., Ltd.
	One-part Moisture-curing Elastic Adhesive TB1530	Three Bond Co., Ltd.
−40 to 150°C	One-part Epoxy Resin: TB2285	Three Bond Co., Ltd.
	Two-part Epoxy Resin: TB2087	Three Bond Co., Ltd.



CHECK! When embedding the V680-D1KP52MT into a metal surface, use the V680-HS51/-HS52 Antenna. Communications will not be possible if the V680-HS63 Antenna is used.

CHECK! Refer to *Differences in Surrounding Metals(Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680-D1KP52MT.
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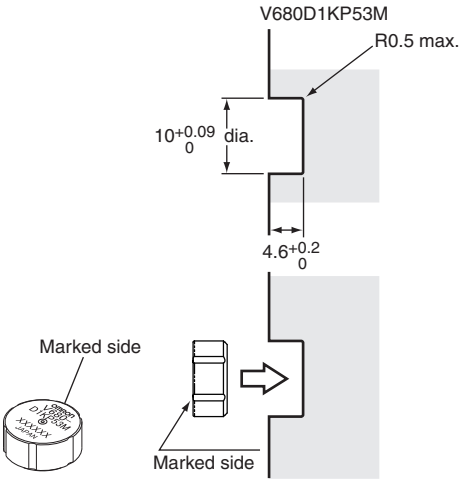
V680-D1KP53M

■ RF Tag Installation Direction

Mount the RF Tags as shown in the diagram on the right. The epoxy adhesives listed in the following table are recommended for the given temperature ranges.

Ambient operating temperature	Product name	Manufacturer
−40 to 70°C	Two-part Epoxy-compound Resin: TB2001 (main agent)/ TB2105C (curing agent)	Three Bond Co., Ltd.
	One-part Moisture-curing Elastic Adhesive TB1530	Three Bond Co., Ltd.
−40 to 150°C	One-part Epoxy Resin: TB2285	Three Bond Co., Ltd.
	Two-part Epoxy Resin: TB2087	Three Bond Co., Ltd.



CHECK! When embedding the V680-D1KP53M into a metal surface, use the V680-HS51/-HS52 Antenna. Communications will not be possible if the V680-HS63 Antenna is used.

CHECK! Refer to *Differences in Surrounding Metals(Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680-D1KP53M.
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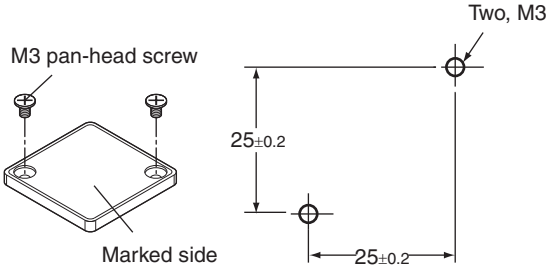
V680-D1KP66T

■ Mounting on Non-metallic Material

Mount the RF Tag using M3 pan-head screws from the marked side.
Tightening torque: 0.3 to 0.5 N·m

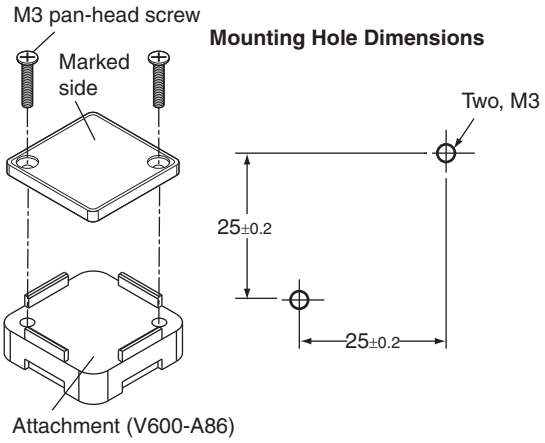
Mounting Hole Dimensions



■ Mounting on Metallic Material

The communications range will decrease if there is metal at the back of the V680-D1KP66T RF Tag.
If the RF Tag is mounted to metallic material, use the separately sold Special Attachment (V600-A86) or a non-metallic spacer (e.g., plastic or resin).

Mounting Hole Dimensions



CHECK! Refer to *Effect of Metal on Back of RF Tags (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680-D1KP66T.
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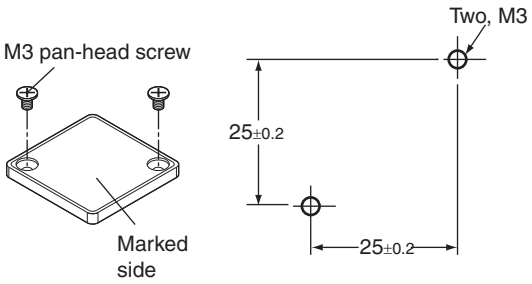
V680-D1KP66MT

Mount the RF Tag to metal using M3 pan-head screws from the marked side. Tighten the screws to a torque of 0.3 to 0.5 N·m.

Mounting Hole Dimensions



CHECK! Refer to *Effect of Surrounding Metals (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680-D1KP66MT.
p.149

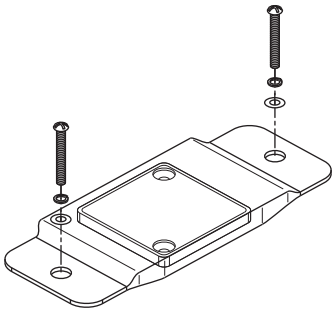
V680-D1KP66T-SP

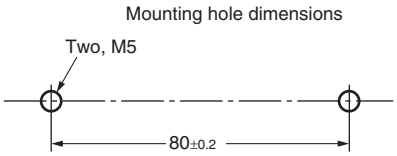
■ RF Tag Installation

Mount the RF Tags with M5 screws and washers.

Tightening torque: 1.2 N·m.

There are no restrictions to the mounting direction of the RF Tags or the direction of movement for Antennas.





CHECK! Refer to *Effect of Metal on Back of RF Tags (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680-D1KP66T-SP.
p.151

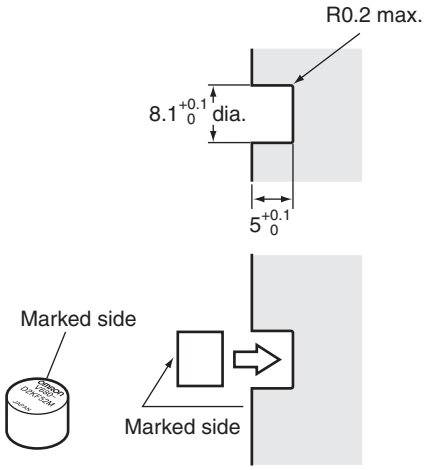
V680-D2KF52M

■ RF Tag Installation

Mount RF Tags as shown in the diagram on the right.

The epoxy adhesives listed in the following table are recommended for the given temperature ranges.

Ambient operating temperature	Product name	Manufacturer
–40 to 70°C	Two-part Epoxy-compound Resin: TB2001 (main agent)/TB2105C (curing agent)	Three Bond Co., Ltd.
	One-part Moisture-curing Elastic Adhesive TB1530	Three Bond Co., Ltd.
–40 to 85°C	One-part Epoxy Resin: TB2285	Three Bond Co., Ltd.
	Two-part Epoxy Resin: TB2087	Three Bond Co., Ltd.



CHECK! When embedding the V680-D2KF52M into a metal surface, use the V680-HS51/-HS52 Antenna. Communications will not be possible if the V680-HS63 Antenna is used.

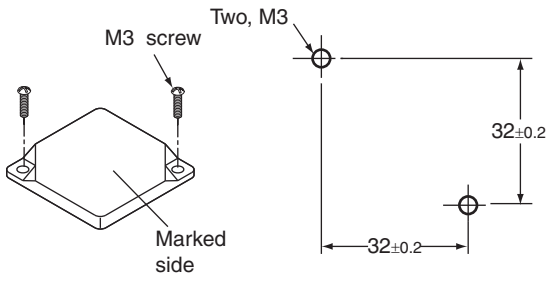
CHECK! Refer to *Differences in Surrounding Metals* in *Section 7 Appendices* for information on the effect of metal behind the V680-D2KF52M.
p.154

V680-D8KF67/-D8KF67M

■ RF Tag Installation

Secure the RF Tag with M3 screws. Tighten the screws to a torque of 0.6 N·m.

Mounting Hole Dimensions



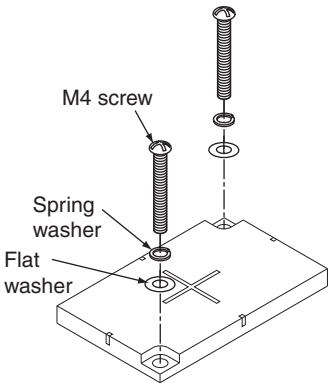
CHECK! Refer to *Effect of Surrounding Metals (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680-D8KF67M.
p.158

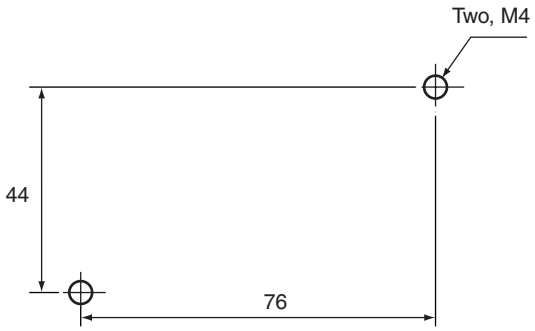
CHECK! Refer to *Effect of Metal on Back of RF Tags (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680-D8KF67.
p.156

V680-D8KF68/-D32KF68

■ RF Tag Installation

Secure the RF Tag with M4 screws. Tighten the screws to a torque of 0.7 to 1.2 N·m.





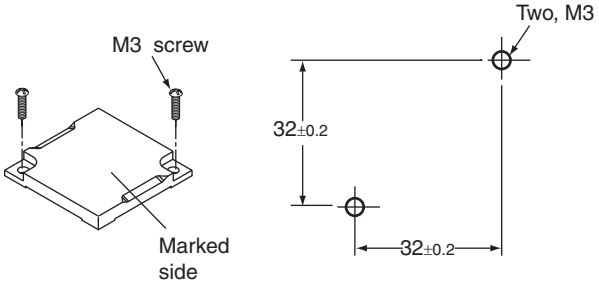
CHECK! Refer to *Effect of Surrounding Metals (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680-D8KF68/-D32KF68.
p.160

V680S-D2KF67/-D2KF67M

■ RF Tag Installation

Secure the RF Tag with M3 screws. Tighten the screws to a torque of 0.6 N·m.

Mounting Hole Dimensions



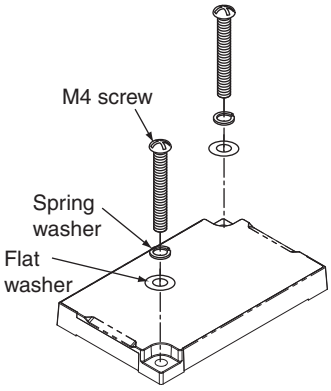
CHECK! Refer to *Effect of Surrounding Metals (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680S-D2KF67M.
p.165

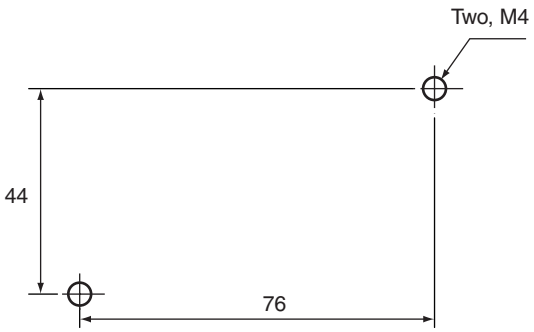
CHECK! Refer to *Effect of Metal on Back of RF Tags (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680S-D2KF67.
p.163

V680S-D2KF68/-D2KF68M

■ RF Tag Installation

Secure the RF Tag with M4 screws. Tighten the screws to a torque of 0.7 to 1.2 N·m.





CHECK! Refer to *Effect of Surrounding Metals (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680S-D2KF68M.
p.170

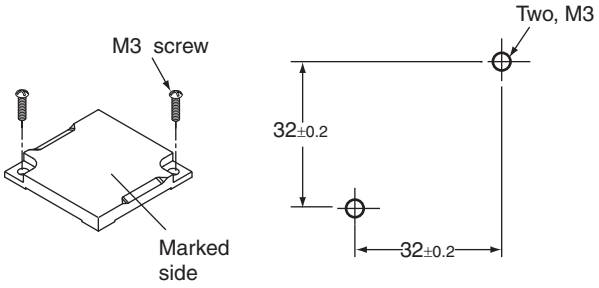
CHECK! Refer to *Effect of Metal on Back of RF Tags (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680S-D2KF68.
p.167

V680S-D8KF67/-D8KF67M

■ RF Tag Installation

Secure the RF Tag with M3 screws. Tighten the screws to a torque of 0.6 N·m.

Mounting Hole Dimensions



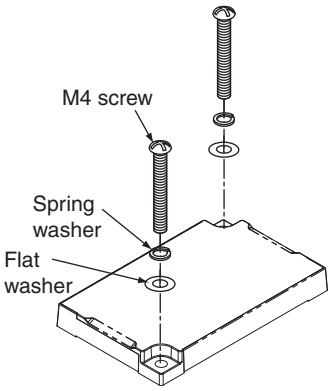
CHECK! Refer to *Effect of Surrounding Metals (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680S-D8KF67M.
p.175

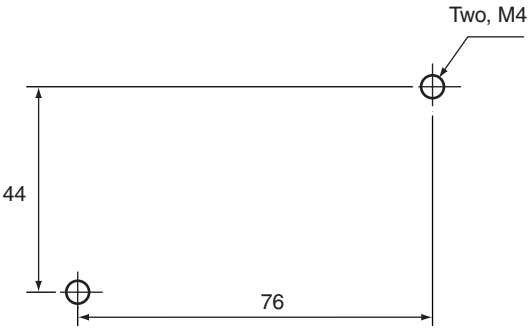
CHECK! Refer to *Effect of Metal on Back of RF Tags (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680S-D8KF67.
p.173

V680S-D8KF68/-D8KF68M

■ RF Tag Installation

Secure the RF Tag with M4 screws. Tighten the screws to a torque of 0.7 to 1.2 N·m.





CHECK! Refer to *Effect of Surrounding Metals (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680S-D8KF68M.
p.180

CHECK! Refer to *Effect of Metal on Back of RF Tags (Reference)* in *Section 7 Appendices* for information on the effect of metal behind the V680S-D8KF68.
p.177

SECTION 3
Preparations for Communications

Parameter Settings for FL Remote Communications 42

Parameter Settings for FL Remote Communications

Set the following link parameters of the JTEKT PLC to enable using the FL Remote ID. Refer to the JTEKT Master Operation Manual for details on how to set the Link No., Slot No., and Link Module Name.

CHECK!

Use JTEKT PCwin Ver 8.** Programming Tool to set the parameters of the FL Remote ID.

Communications Transmission Bytes

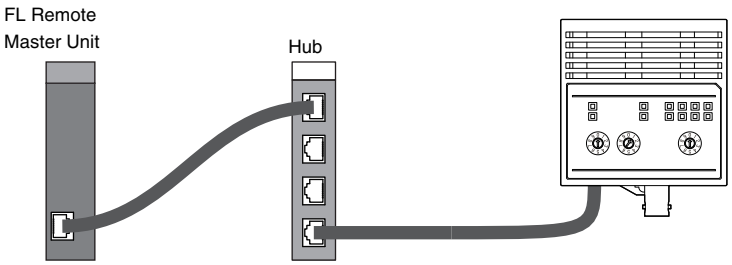
The number of communications transmission bytes for the FL Remote ID is shown in the following table.

No. of input bytes	No. of output bytes
8	8

Example Settings

This section describes the parameters that can be set with PCwin.

■ Example of System Configuration



■ I/O Module Settings

Select ***I/O Module*** from the PCwin Parameter Menu and select the rack number and slot number where the Module is installed.

Click the **Settings** Button in the I/O Module Dialog Box and select the following settings for the I/O Module.

- Module Type: (R) Special/Communications
- Module Name: FL Remote M

■ Link Parameter Settings

Select ***Link Parameter*** from the parameter menu and select the program number and link number.

Click ***Link Settings*** in the Link Parameter Settings Dialog Box. Select the following Link Module name.

- Link Module Name: FL Remote M

■ FL Remote M Detail Settings

Click the **Details** Button in the Link Parameter Settings Dialog Box and select the parameter that you want to use.

The FL Remote ID does not have a diagnostic function. Parameters cannot be set for this function.

■ Slave Settings Communications Procedure

Click the **Slave Settings** (E) Button in the FL Remote M Detail Settings Dialog Box and set the parameters as shown below.

- Slave Connection Settings Select
- Transfer bytes Settings 8 input bytes, 8 output bytes
- Expansion Settings Disable

MEMO

SECTION 4
Functions

Communications Specifications	46
Write Protection	49
Noise Measurement	52
RF Tag Service Life Warning Management (EEPROM type)	53

Communications Specifications

With the FL Remote ID, communications with the RF Tags is determined by the operating mode set on the mode switch, the command selected, and the options selected to execute the command.

Operating mode

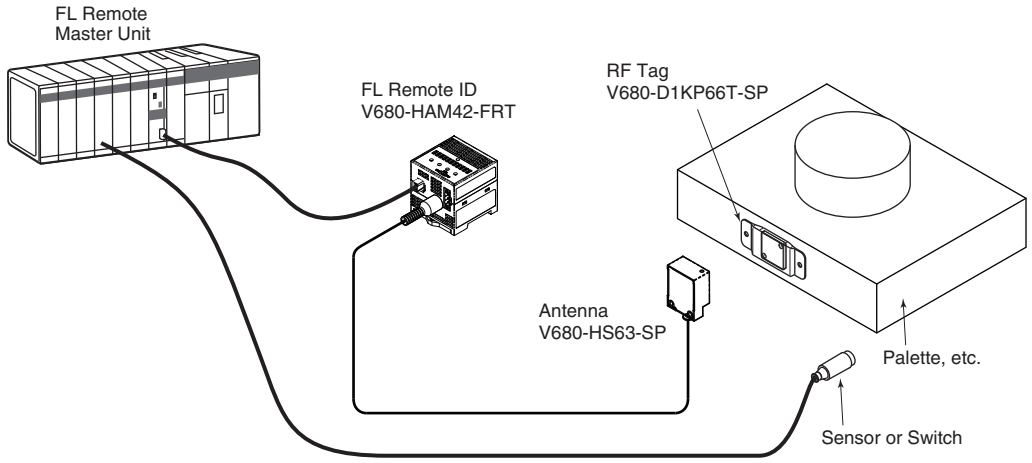
There are four operating modes.

CHECK!

For the mode settings, refer to *Part Names and Functions* in *Section 1*.
p.13

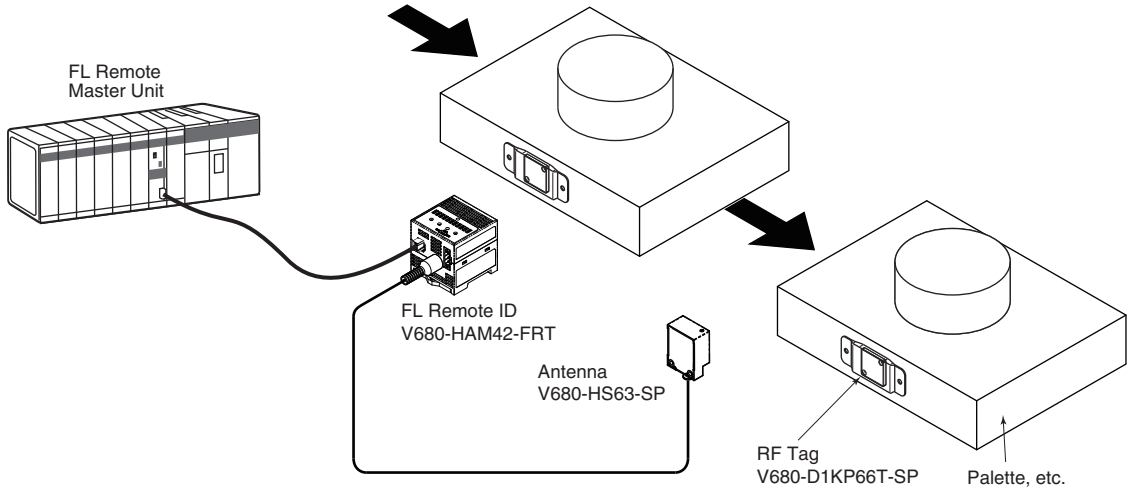
■ Trigger Mode

When the RF Tag on a workpiece or palette moves within the communications range of the Antenna, it is detected by a sensor or a switch. A control signal (trigger signal) is output from the PLC to the FL Remote ID, which triggers the FL Remote ID to begin communications with the RF Tag. The FL Remote ID reads the RF Tag data and outputs the results to the PLC.



■ Auto Mode

When the RF Tag of a workpiece or palette is within the communications range of the Antenna, the Remote ID automatically begins communications with the RF Tag and outputs the result to the PLC.



■ Test Mode

During system installation or maintenance, set the switch on the Unit to Test Mode. When the power supply is turned ON, the RF Tag data will be read, and the communications results will be displayed on the indicators.

■ Noise Level Measurement Mode

If communications with the RF Tag is unstable, set the switch on the Unit to the Noise Level Measurement Mode. When the power supply is turned ON, the noise around the Antenna will be measured, and the noise measurement results will be displayed on the indicators.

Commands

Communications with the RF Tag is controlled by commands allocated to the FL Remote signals.

- READ
- WRITE
- DATA FILL
- NOISE MEASUREMENT

Noise measurement is not a command used for communications with RF Tag, but a command used for maintenance. Refer to *Noise Measurement* for details.

p.52

■ READ

Data in the RF Tag memory is read by specifying the number of bytes to process.

■ WRITE

Data is written to the RF Tag by specifying the memory address, number of bytes to process, and the data.

■ DATA FILL

Based on the specified address, number of blocks to process, and data, the specified memory area of the RF Tag is filled with the same data.

■ NOISE MEASUREMENT

The strength of noise received by the Antenna is measured.

Options

The following functions can be used by setting the control signal options settings.

- Communications Speed
- Write Protection
- Output Time
- RF Tag Service Life Warning Management

■ Communications Speed

The communications time required for writing large amounts of data to the RF Tag using the DATA FILL command can be reduced by setting the communications speed to high.

Be aware that the noise resistance may be lower during communications when this function is being used.

CHECK!

For details on the communications time, refer to *Communications Time (Reference)*.
p.137

■ Write Protection

Important data stored in the memory of an RF Tag, such as the product model or type, can be protected from being overwritten inadvertently by enabling the Write Protection function.

CHECK!

Refer to *Write Protection* for details.
p.49

■ Output Time

When auto mode is being used, the result output time can be set to either 100 ms or 500 ms.

CHECK!

Refer to *Timing Charts* for details on output timing.
p.67

■ RF Tag Service Life Warning Management

With the FL Remote ID, the service life for data write operations can be automatically managed, and a warning can be output if the number of data write operations exceeds 100,000.

A memory capacity of 992 bytes is required to enable RF Tag service life warning management.

CHECK!

Refer to *RF Tag Service Life Warning Management (EEPROM type)* for details.
p.53

Write Protection

The write protection function protects important data stored in the memory of a RF Tag, such as the product model or type, from being overwritten inadvertently.
Enable the write protection function after writing important data as described in this section.

Setting Write Protection

For the write protection function to be effective, it must be enabled or disabled in both the FL Remote ID settings and the RF Tag settings.

1. FL Remote ID Settings

The write protection function can be enabled or disabled by setting the write-protect bit of the FL Remote ID in the I/O Allocation Table.

Refer to the *I/O Allocation Table* and *Signal Names and Functions* for details.

p.60, p.61

2. RF Tag Settings

Write protection for individual RF Tags is set in the most significant bit of address 0000 hex.
Write protection is set in the 4 bytes from RF Tag address 0000 to 0003 hex.

Address \ Bit	7	6	5	4	3	2	1	0
0000 hex	Enable/disable	Upper two digits of start address (00 to 7F)						
0001 hex	Lower two digits of start address (00 to FF)							
0002 hex	Upper two digits of end address (00 to FF)							
0003 hex	Lower two digits of end address (00 to FF)							

- Write-protect bit (most significant bit of address 0000 hex)
  1: Write-protected (Enable)
  0: Not write-protected (Disable)
- Addresses in RF Tag Memory That Can Be Write Protected
  Start address: 0000 to 7FFF hex
  End address: 0000 to FFFF hex

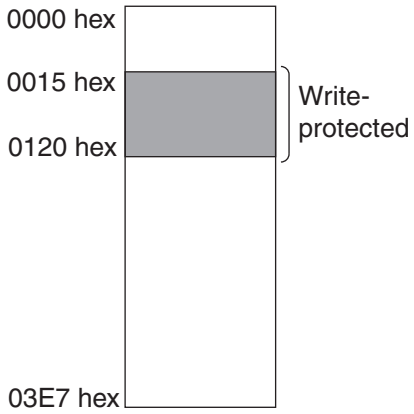
Note: If the write protection function is not used, the write protection setting addresses can be used as user memory. When doing this, make sure that the write-protect bit is disabled in the FL Remote ID.

■ Example of Write Protection

▪ Start Address Is Lower Than the End Address

The memory area between the start address and end address will be write-protected.

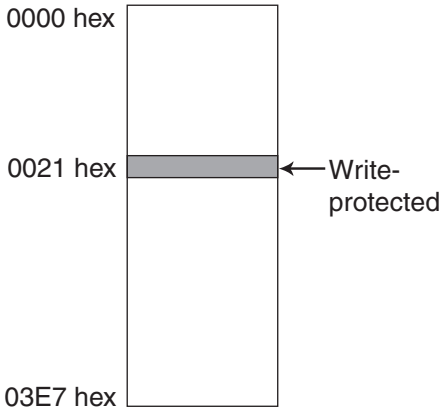
Address \ Bit	Upper digits				Lower digits			
0000 hex	1	0	0	0	0	0	0	0
	8				0			
0001 hex	0	0	0	1	0	1	0	1
	1				5			
0002 hex	0	0	0	0	0	0	0	1
	0				1			
0003 hex	0	0	1	0	0	0	0	0
	2				0			



▪ Start Address Is Equal to End Address

Only the selected address (one byte) will be write-protected.

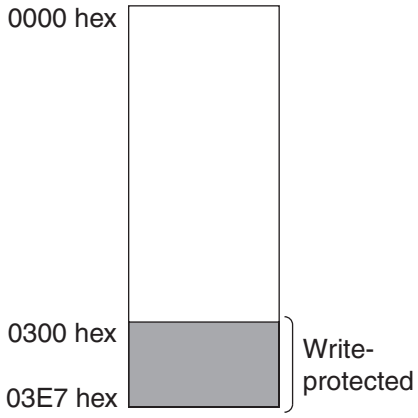
Address \ Bit	Upper digits				Lower digits			
0000 hex	1	0	0	0	0	0	0	0
	8				0			
0001 hex	0	0	1	0	0	0	0	1
	2				1			
0002 hex	0	0	0	0	0	0	0	0
	0				0			
0003 hex	0	0	1	0	0	0	0	1
	2				1			



▪ End Address Is Higher than the Last RF Tag Address

The memory area between the start address and the last RF Tag address will be write-protected.

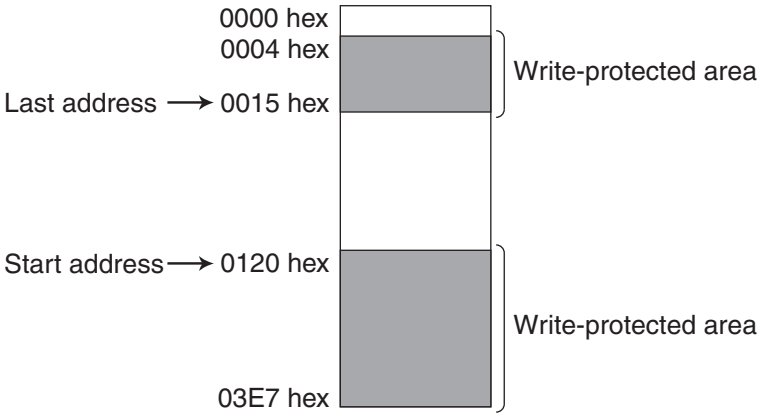
Address \ Bit	Upper digits				Lower digits			
0000 hex	1	0	0	0	0	0	1	1
	8				3			
0001 hex	0	0	0	0	0	0	0	0
	0				0			
0002 hex	0	0	0	0	0	0	1	1
	0				3			
0003 hex	1	1	1	1	1	1	1	1
	F				F			



▪ Start Address Is Higher Than End Address

The memory area between the start address and the last RF Tag address, as well as the area between 0004 hex and the end address will be write-protected.

Address \ Bit	Upper digits				Lower digits			
0000 hex	1	0	0	0	0	0	0	1
	8				1			
0001 hex	0	0	1	0	0	0	0	0
	2				0			
0002 hex	0	0	0	0	0	0	0	0
	0				0			
0003 hex	0	0	0	1	0	1	0	1
	1				5			



■ Disabling Write Protection

▪ Disabling Write Protection for Part of the RF Tags

Set the uppermost bit of 0000 hex to 0.

▪ Disabling All Write Protection for the Whole RFID system

Set the Write Protection Enable Bit to 1 in the FL Remote ID.

CHECK!

Caution When Using Write Protection

The write protect function is a FL Remote ID function. It cannot be used with Reader/Writers manufactured by other companies.

Noise Measurement

You can check whether noise that affects communications with RF Tags exists in the surroundings where the Antenna and Reader/Writer are installed.

When a noise measurement command is sent from the PLC, the noise strength received by the Antenna is output in a value from 00 to 63.
To start in Noise Level Measurement Mode, set the mode switch to 3, and then start the Unit. The noise strength will be displayed in five levels on the data display. It can be checked directly from the FL Remote ID.

CHECK!

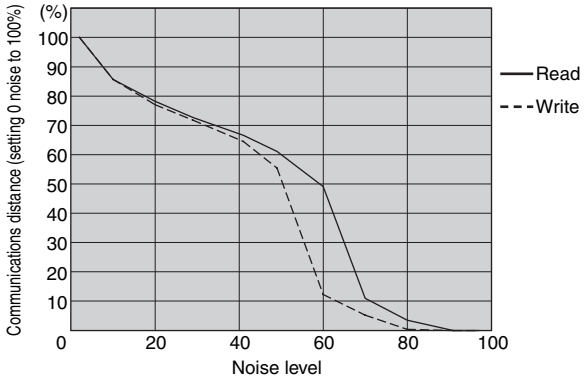
Refer to *NOISE MEASUREMENT* for details of the noise measurement command.
p.66

Relationship between Result Output and Display

Result output	DATA display status	Result Output	DATA display status
00 to 09	7 6 5 4 / 3 2 1 0 (all off)	10 to 19	7 6 5 4 (4 on) / 3 2 1 0 (0 on)
20 to 29	7 6 5 4 (5, 4 on) / 3 2 1 0 (1, 0 on)	30 to 39	7 6 5 4 (6, 5, 4 on) / 3 2 1 0 (2, 1, 0 on)
40 to 99	7 6 5 4 (all on) / 3 2 1 0 (all on)		

Note: The result is output as a decimal value.

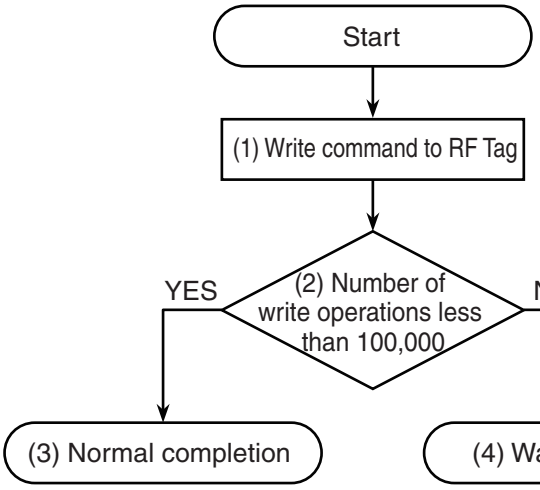
Example of Effect on Result Output and Communications Range (Reference Data)



RF Tag Service Life Warning Management (EEPROM type)

The number of RF Tag of EEPROM type write operations can be automatically managed in the RF Tag memory. A warning is output from the FL Remote ID to the PLC if the upper limit is exceeded. A memory capacity of 992 bytes is required to enable RF Tag service life warning management.

Warning Management Process



(1) A write command (DATA WRITE or DATA FILL) is executed to the RF Tag. The number of write operations is counted automatically counted in the RF Tag.

(2) The number of write operations is judged.

(3) The completion is normal if the number of write operations is lower than 100,000.

(4) A warning is output if the number of write operations is 100,000 or higher.

CHECK!

Precaution on RF Tag Service Life Warning Management

RF Tag service life management is a function of the FL Remote ID. RF Tag service life management is not supported for other models or reader/writers made by other companies.

Setting RF Tag Service Life Warning Management

There are settings in the FL Remote ID to enable and disable RF Tag service life warning management. To use RF Tag service life warning management, always make the settings for the FL Remote ID.

■ Setting the FL Remote ID

RF Tag service life warning management for the FL Remote ID can be enabled or disabled by using the RF Tag Service Life Warning Bit in the I/O Allocation Table.

For details, refer to *I/O Allocation Table* and *Signal Names and Functions*.

p.60, p.61

Preparing RF Tags

To use RF Tag service life warning management, always initialize unused RF Tags.

■ Initializing RF Tags

Use the following procedure to initialize unused RF Tags if they are to be used with RF Tag service life warning management.

(1) Disable the RF Tag service life warning management for FL the Remote ID.
(2) Write 00 hex to the eight bytes from addresses 03E0 to 03E7 hex of the RF Tag.
(3) Enable the RF Tag service life warning management for the FL Remote ID.

For details, refer to *I/O Allocation Table* and *Signal Names and Functions*.

p.60, p.61

Warning from RF Tag Service Life Warning Management

A warning will be output if RF Tag service life management warning management is enabled for the FL Remote ID and the number of write operations is 100,000 or higher.

▪ Checking with I/O Allocation Table

When a warning is output with RF Tag service life warning management, the FL Remote ID will turn ON the RF Tag Service Life Warning Bit in the I/O Allocation Table.

The Normal End Bit will turn ON, but the Error End Bit will not turn ON.

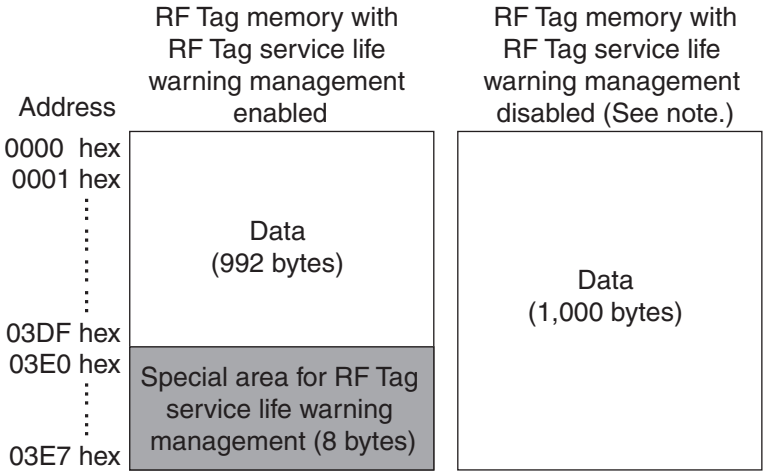
For details, refer to *I/O Allocation Table* and *Signal Names and Functions*.

p.60, p.61

RF Tag Memory Map (EEPROM type)

When RF Tag service life warning management is enabled, the number of rewrites is saved in hexadecimal in the eight bytes from addresses 03E0 to 03E8 hex. Therefore, when RF Tag service life warning management is enabled, it will be possible to use only 992 bytes from addresses 0000 to 03DF hex.

When RF Tag service life warning management is disabled and an ID Controller, Handheld Reader/Writer, or controller made by another company is used, it will be possible to use all 1,000 bytes from addresses 0000 to 03E7 hex.



Note: Including ID Controllers, Handheld Reader/Writers, or controllers made by other companies.

Legend

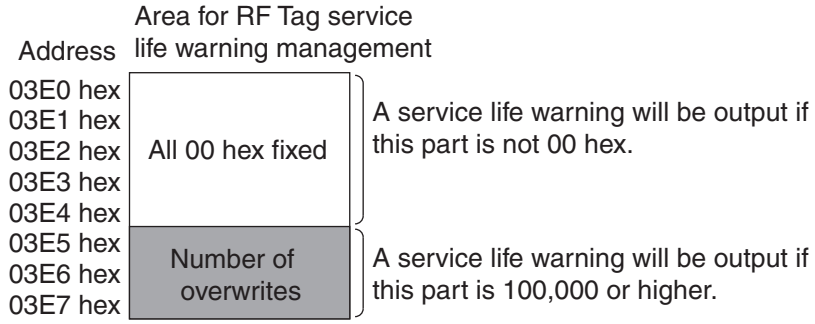
Data	DATA READ, DATA WRITE, and DATA FILL can be performed.
Special area for RF Tag service life warning management	DATA READ, DATA WRITE, and DATA FILL cannot be performed.

Note: If RF Tag service life warning management is not used, addresses 03E0 to 03E7 hex can be used as user memory. Be sure to disable RF Tag service life warning management of the FL Remote ID to use these addresses.

CHECK! RF Tag service life management is a function of FL Remote ID. If an ID Controller, Handheld Reader/writer, or controller made by another company is used, do not overwrite address 03E0 to 03E7 hex when using this function unless initializing unused RF Tags.

Area for RF Tag Service Life Warning Management

Addresses 03E0 to 03E7 hex are used for the RF Tag service life warning management. If RF Tag service life warning management is disabled or you are using an ID Controller, Handheld Reader/writer, or controller made by another company, refer to the following if this area will be read or written to.



Always set the five bytes from 03E0 to 03E4 hex to 00 hex. When RF Tag service life warning management is enabled and data other than 00 hex is written, it will be treated as illegal data and a service life warning will be output.

The number of overwrites is recorded in the three bytes in addresses 03E5 to 03E7 hex. When RF Tag service life warning management is enabled, the following operation will be performed according to the number of overwrites that is recorded.

Before writing		After writing	
Overwrites		Overwrites	Service life warning
0 to 99,998	→	1 to 99,999	Not output
99,999	→	100,000	Output
100,000 or higher	→	100,000 or higher	Output

(1) If the number of overwrites is lower than 100,000 after writing:
A service life warning will not be output. The number of overwrites will increase by 1.

(2) If the number of overwrites is 100,000 after writing:
A service life warning will be output. The number of overwrites will be 100,000.

(3) If the number of overwrites is higher than 100,000 after writing:
A service life warning will be output. The number of overwrites will not change.

■ Examples of Area for RF Tag Service Life Warning Management

▪ If the Number of Overwrites Is 0 (i.e., If the Number of Overwrites Is Initialized):

Data will be written to the RF Tag the next time that DATA WRITE or DATA FILL is performed. A service life warning will not be output. The number of overwrites will change to 1.

Address	Data
03E0 hex	00 hex
03E1 hex	00 hex
03E2 hex	00 hex
03E3 hex	00 hex
03E4 hex	00 hex
03E5 hex	00 hex
03E6 hex	00 hex
03E7 hex	00 hex

Always 00 hex.

The number of overwrites is 0 (000000 hex).

DATA WRITE or DATA FILL

Address	Data
03E0 hex	00 hex
03E1 hex	00 hex
03E2 hex	00 hex
03E3 hex	00 hex
03E4 hex	00 hex
03E5 hex	00 hex
03E6 hex	00 hex
03E7 hex	01 hex

The number of overwrites is 1 (000001 hex).

▪ If the Number of Overwrites Is 99,999:

Data will be written to the RF Tag the next time that DATA WRITE or DATA FILL is performed. Also, a service life warning will be output. The number of overwrites will change to 100,000.

Address	Data
03E0 hex	00 hex
03E1 hex	00 hex
03E2 hex	00 hex
03E3 hex	00 hex
03E4 hex	00 hex
03E5 hex	01 hex
03E6 hex	86 hex
03E7 hex	9F hex

Always 00 hex.

The number of overwrites is 99,999 (01869F hex).

DATA WRITE or DATA FILL

Address	Data
03E0 hex	00 hex
03E1 hex	00 hex
03E2 hex	00 hex
03E3 hex	00 hex
03E4 hex	00 hex
03E5 hex	01 hex
03E6 hex	86 hex
03E7 hex	A0 hex

+ Service life warning

The number of overwrites is 100,000 (0186A0 hex).

▪ If the Number of Overwrites Is 100,000:

Data will be written to the RF Tag the next time that DATA WRITE or DATA FILL is performed. Also, a service life warning will be output. The number of overwrites will not change.

Address	Data
03E0 hex	00 hex
03E1 hex	00 hex
03E2 hex	00 hex
03E3 hex	00 hex
03E4 hex	00 hex
03E5 hex	01 hex
03E6 hex	86 hex
03E7 hex	A0 hex

Always 00 hex.

The number of overwrites is 100,000 (0186A0 hex).

DATA WRITE or DATA FILL

Address	Data
03E0 hex	00 hex
03E1 hex	00 hex
03E2 hex	00 hex
03E3 hex	00 hex
03E4 hex	00 hex
03E5 hex	01 hex
03E6 hex	86 hex
03E7 hex	A0 hex

+ Service life warning

The number of overwrites is 100,000 (0186A0 hex). The number is not changed.

CHECK!

To read or write to the area for RF Tag service life warning management, enable RF Tag service life warning management or use an ID Controller, handheld reader/writer, or a controller made by another company.

MEMO

SECTION 5
Communications

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I/O Specifications

I/O Allocation Table

The FL Remote ID is allocated 64 inputs and 64 outputs in the PLC.
The inputs and outputs that are allocated depend on the node address of the FL Remote ID.

■ Master Unit to FL Remote ID

	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	TRG/ INHIBIT	Option specifications				NOT USED			Tag communications command specification (CMD)				Data length specification (LEN) (DATA READ, DATA WRITE)			
		Output time (OUTPUT TIME)	Write protection (WRITE PROTECT)	Communications speed (HISPD)	ID tag service life warning (ID TAG LIFE)				NOISE MEASUREMENT (CMD3)	DATA FILL (CMD2)	DATA WRITE (CMD1)	DATA READ (CMD0)	4 bytes (LEN3)	3 bytes (LEN2)	2 bytes (LEN1)	1 bytes (LEN0)
													Data length specification (LEN) (DATA FILL)			
													Specification × 8 bytes			
CIO +1	Start address (ADDR)															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +2	Second-byte data (OD1)								First-byte data (OD0)							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
CIO +3	Fourth-byte data (OD3)								Third-byte data (OD2)							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

■ FL Remote ID to Master Unit

	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	Test mode (TEST MODE)	Noise measurement mode (NOISE MODE)	NOT USED				BUSY	RUN	NOT USED						Error end (ERROR)	Normal end (NORMAL)
CIO +1	Error end type (ERR_SUB)															
	System error (ERR_SUB15)	Switch error (ERR_SUB14)	Command error (ERR_SUB13)	NOT USED					ID tag service life warning (ERR_SUB7)	ID system error 2 (ERR_SUB6)	ID system error 1 (ERR_SUB5)	Mismatch error (ERR_SUB4)	Protection error (ERR_SUB3)	Address error (ERR_SUB2)	ID tag communications error (ERR_SUB1)	ID tag missing error (ERR_SUB0)
CIO +2	Second-byte data (ID1)								First-byte data (ID0)							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
CIO +3	Fourth-byte data (ID3)								Third-byte data (ID2)							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

Signal Names and Functions

■ Master Unit to FL Remote ID

Signal	Name	Function
OD 0-0 to OD 0-7	Write Data	Input data to write to RF Tags.
OD 1-0 to OD 1-7		
OD 2-0 to OD 2-7		
OD 3-0 to OD 3-7		
ADDR 0 to 15	Address	Specify the read, write, and data fill start addresses. Range of specification: 0000 to FFFF hex
LEN 0 to 3	Data Length	Specifies the data length for reading and writing. Specification method:1 byte: Set LEN0 to 1. 2 bytes: Set LEN1 to 1. 3 bytes: Set LEN2 to 1 4 bytes: Set LEN3 to 1 Note: A command error will occur if no specification is set to 1 or if two or more specifications are set to1.
		Specify the number of blocks to process in the RF Tag when using the DATA FILL command. Specification range: 0 to F hex Values of 1 to F hex specify the number of blocks to process (value specified × 8 bytes). A value of 0 hex specifies all blocks starting from the DATA FILL start address.
CMD 0 to 3	Command	Specify the command to execute. Specification method: DATA READ: Set CMD0 to 1. DATA WRITE: Set CMD1 to 1. DATA FILL: Set CMD2 to 1. NOISE MEASUREMENT: Set CMD3 to 1. Note: A command error will occur if no specification is set to 1 or if two or more specifications are set to1.
TRG/$\overline{\text{INHIBIT}}$	Execution Control	When in trigger mode, set this signal to 1 to start communications with an RF Tag.
		When in auto mode, set this signal to 0 to stop, and to 1 to start communications with RF Tags.
HISPD	Communications Speed	Set to 0 for normal communications speed. Set to 1 for high speed communications.
WRITE PRO-TECT	Write Protection	Set to 0 to enable the write protection function for FL Remote ID. Set to 1 to disable the write protection function for FL Remote ID.
OUTPUT TIME	Output Time	Function can be enabled in Auto Mode only. Set to 0 to set a 100-ms result output time. Set to 1 to set a 500-ms result output time.
RF Tag LIFE	RF Tag Service Life Warning Management	Set to 0 to enable RF Tag service life warning management. Set to 1 to disable RF Tag service life warning management.

■ FL Remote ID to Master Unit

Signal	Name	Function
TEST MODE	Test Mode	Outputs 1 during operation in test mode when the mode switch is set to 2.
NOISE MODE	Noise Measurement Mode	Outputs 1 during operation in noise measurement mode when the mode switch is set to 3.
ID 0-0 to 7	READ DATA	Outputs data read from RF Tags when DATA READ is performed. Outputs measured values when noise measurement is performed.
ID 1-0 to 7		
ID 2-0 to 7		
ID 3-0 to 7		
RUN	Operating	Outputs 1 when the FL Remote ID is running normally.
BUSY	Executing	Outputs 1 when TRG is 1 in trigger mode. Outputs 1 when $\overline{\text{INHIBIT}}$ is 1 in auto mode.
NORMAL	Normal End	Outputs 1 when communications with RF Tags was terminated normally.
ERROR	Error End	Outputs 1 when communications with an RF Tag was terminated because of an error. By checking the type of ERR_SUB□, the error details can be checked.
ERR_SUB 15	System Error	Outputs 1 when FL Remote ID cannot be operated.
ERR_SUB 14	Switch Error	Outputs 1 when there is an error in the mode switch setting.
ERR_SUB 13	Command Error	Outputs 1 when there is a command error or the command cannot be received.
ERR_SUB 7	RF Tag Service Life Warning	Outputs 1 when the number or RF Tag overwrites is 100,000 or higher.
ERR_SUB 6	ID System Error 2	Outputs 1 when an RF Tag that is not supported by the FL Remote ID was used.
ERR_SUB 5	ID System Error 1	Outputs 1 when an RF Tag that is not supported by the FL Remote ID was used.
ERR_SUB 4	Mismatch Error	Outputs 1 when data was not correctly written to the RF Tag.
ERR_SUB 3	Protection Error	Outputs 1 when a command was executed to write data to the write-protected area of an RF Tag.
ERR_SUB 2	Address Error	Outputs 1 when the memory area specified by the command was outside the memory area of the RF Tag.
ERR_SUB 1	RF Tag Communications Error	Outputs 1 when the RF Tag was detected but communications could not be ended normally with the RF Tag in trigger mode.
ERR_SUB 0	RF Tag Missing Error	Outputs 1 when a RF Tag could not be detected in trigger mode was used.

Detailed Command Settings

The FL Remote ID commands are listed in the following tables.

DATA READ

■ Master Unit to FL Remote ID

Signal	Bit length	Value	Description
CMD	4	0001_B	Data read
LEN	4	0001_B	Reads 1 byte.
		0010_B	Reads 2 bytes.
		0100_B	Reads 3 bytes.
		1000_B	Reads 4 bytes.
		Other	Command error
ADDR	16	0000 to FFFF hex	Read start address

■ FL Remote ID to Master Unit

Signal	Bit length	Value	Description
NORMAL	1	0 or 1	Set to 1 when operation is ended normally.
ERROR	1	0 or 1	The corresponding bit is set to 1 if the command ends in an error.
ERR_SUB *	1	0 or 1	The corresponding bit is set to 1 if RF Tag communications end in an error. The details of the error are also given.
ID	32	---	Read data

■ Master Unit to FL Remote ID Settings Example

Example: Reading 2 Bytes of Data from Address 120 hex.

	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	*	*	*	*	*	0	0	0	0	0	1	0	0	1	0	0
	Change according to the setting.						Fixed			DATA READ				2 bytes		
CIO +1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1
								Address 120								
CIO +2	0	1	1	1	1	0	0	0	0	0	0	1	0	0	1	0
								Fixed								
CIO +3	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	1
								Fixed								

DATA WRITE

■ Master Unit to FL Remote ID

Signal	Bit length	Value	Description
CMD	4	0010B	DATA WRITE
LEN	4	0001B	Writes 1 byte.
		0010B	Writes 2 bytes.
		0100B	Writes 3 bytes.
		1000B	Writes 4 bytes.
		Other	Command error
ADDR	16	0000 to FFFF hex	Write start address
OD	32	---	Write data

■ FL Remote ID to Master Unit

Signal	Bit length	Value	Description
NORMAL	1	0 or 1	Set to 1 when operation is ended normally.
ERROR	1	0 or 1	The corresponding bit is set to 1 if the command ends in an error.
ERR_SUB0 to ERR_SUB6, ERR_SUB13 to ERR_SUB15	1	0 or 1	The corresponding bit is set to 1 if RF Tag communications end in an error. The details of the error are also given.
ERR_SUB7	1	0 or 1	The corresponding bit is set to 1 if there is an RF Tag service life warning.

CHECK!

When there is an RF Tag service life warning, the Normal End Bit will be turned ON and the Error End Bit will not be turned ON.

■ Master Unit to FL Remote ID Settings Example

Example: Writing Three Bytes "1278AB hex" Starting from Address 321 hex.

	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	*	*	*	*	*	0	0	0	0	0	1	0	0	1	0	0
	Change according to the setting.						Fixed			DATA WRITE				3 bytes		
CIO +1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1
								Address 321								
CIO +2	0	1	1	1	1	0	0	0	0	0	0	1	0	0	1	0
				78 hex								12 hex				
CIO +3	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	1
				Fixed								AB hex				

DATA FILL

■ Master Unit to FL Remote ID

Signal	Bit length	Value	Description
CMD	4	0100B	DATA FILL
LEN	4	1 to F hex 0 hex	Number of blocks to process (specified number of blocks x 8 bytes) If the number of blocks is 0, all memory after the DATA FILL start address will be selected.
ADDR	16	0000 to FFFF hex	DATA FILL start address
OD 0	8	---	DATA FILL data Data between OD1 and OD3 is invalid.

■ FL Remote ID to Master Unit

Signal	Bit length	Value	Description
NORMAL	1	0 or 1	Set to 1 when operation is ended normally.
ERROR	1	0 or 1	The corresponding bit is set to 1 if the command ends in an error.
ERR_SUB0 to ERR_SUB6, ERR_SUB13 to ERR_SUB15	1	0 or 1	The corresponding bit is set to 1 if RF Tag communications end in an error. The details of the error are also given.
ERR_SUB7	1	0 or 1	The corresponding bit is set to 1 if there is an RF Tag service life warning.

CHECK!

When there is an RF Tag service life warning, the Normal End Bit will be turned ON and the Error End Bit will not be turned ON.

■ Master Unit to FL Remote ID Settings Example

Example: Filling with FF hex to 16 bytes from Address 6 hex (2 Blocks × 8 Bytes/Block)

	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	*	*	*	*	*	0	0	0	0	1	0	0	0	0	1	0
	Change according to the setting.						Fixed			DATA FILL				2 Blocks		
CIO +1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
								Address 6 hex								
CIO +2	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
				Fixed								FF hex				
CIO +3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Fixed								Fixed				

NOISE MEASUREMENT

■ Master Unit to FL Remote ID

Signal	Bit length	Value	Description
CMD	4	1000B	NOISE MEASUREMENT

■ FL Remote ID to Master Unit

Signal	Bit length	Value	Description
NORMAL	1	0 or 1	Set to 1 when operation is ended normally.
ERROR	1	0 or 1	The corresponding bit is set to 1 if the command ends in an error.
ERR_SUB *	1	0 or 1	The corresponding bit is set to 1 if RF Tag communications end in an error. The details of the error will also be given.
ID	32	---	Result of noise measurement ID0: Average noise level (00 hex to 99: decimal) ID1: Maximum noise level (00 hex to 99: decimal) ID2: Minimum noise level (00 hex to 99: decimal) ID3: Always 00 hex

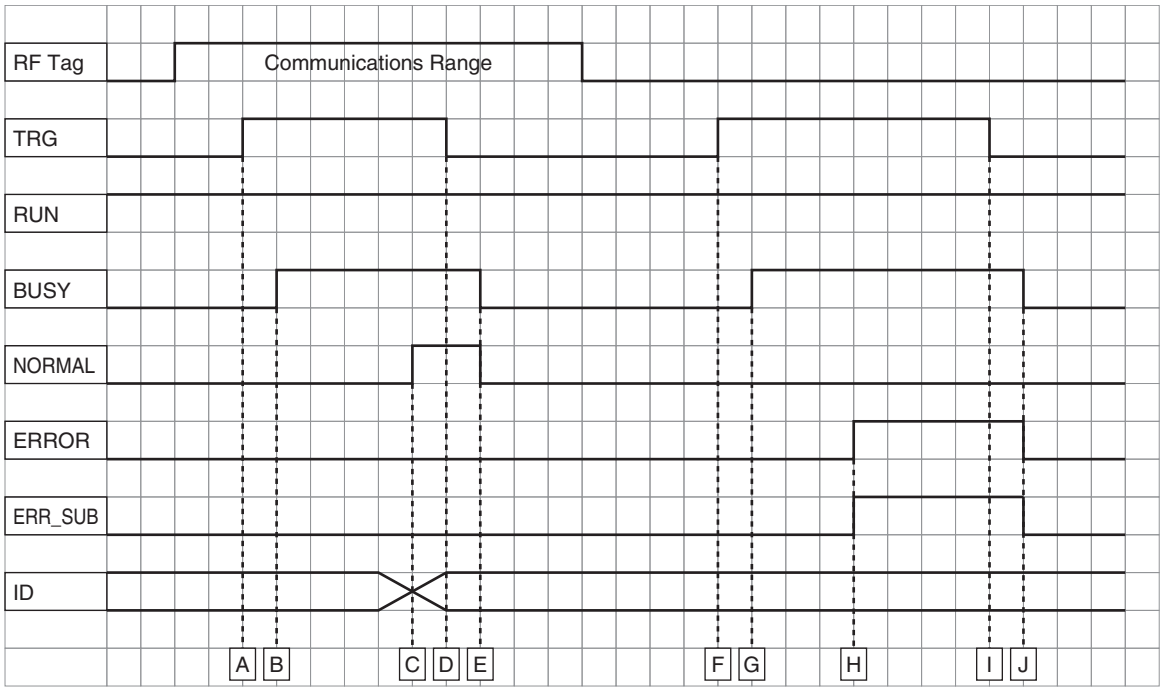
■ Master Unit to FL Remote ID Settings Example

	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CIO +0	*	*	*	*	*	0	0	0	1	0	0	0	0	0	0	0
	Change according to the setting.						Fixed		NOISE MEASUREMENT					Fixed		
CIO +1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
								Fixed								
CIO +2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
								Fixed								
CIO +3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
								Fixed								

Timing Charts

Trigger Mode

The trigger mode timing chart is shown below.



■ RF Tag within the Antenna's Communications Range

A: The PLC turns ON TRG, and sends the execution command to FL Remote ID.

B: The FL Remote ID receives TRG, determines the CMD (command), LEN (data length), and ADDR (start address), starts communications with RF Tag, and then turns ON BUSY.

C: The FL Remote ID turns ON NORMAL when communications with RF Tag ends normally. For READ DATA, the read data is output to the FL Remote ID. For NOISE MEASUREMENT, the measurement data is output to the FL Remote ID.

D: Check from PLC that NORMAL Signal is ON, and then turn OFF TRG.

E: After confirming that TRG is OFF, the FL Remote ID turns OFF BUSY and NORMAL.

■ RF Tag Not within Communications Range

F: The PLC turns ON TRG and sends execution command to FL Remote ID.

G: The FL Remote ID receives TRG, starts communications with RF Tag, and then turns ON BUSY.

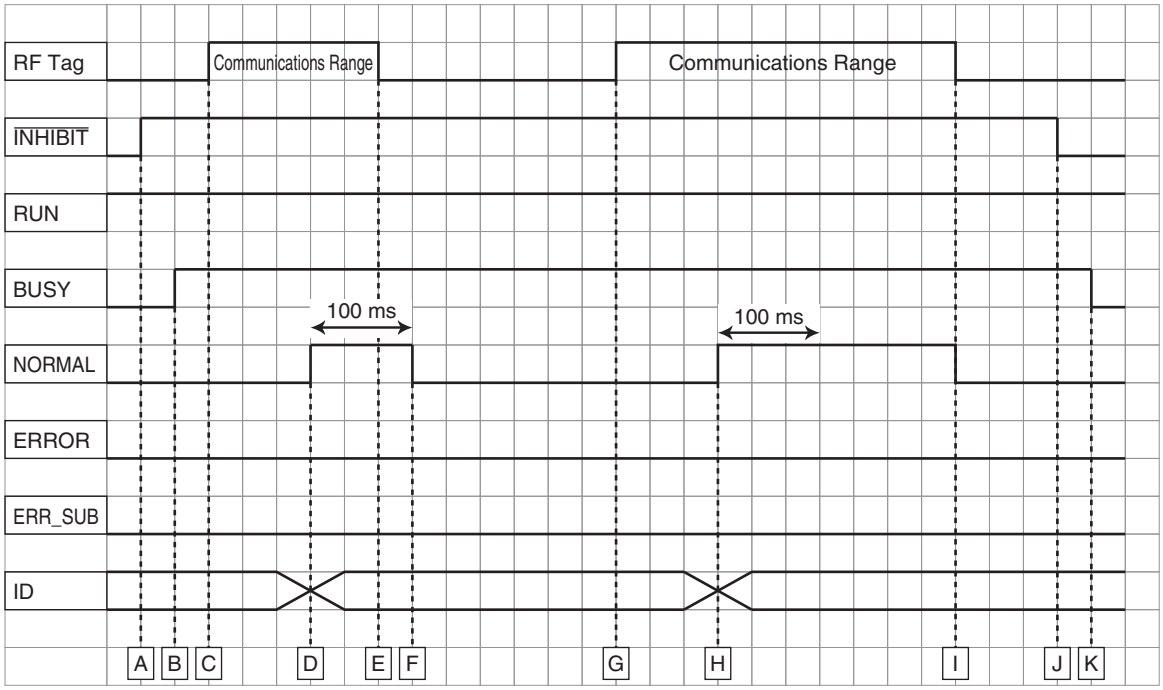
H: When communications with RF Tag ends in an error, FL Remote ID turns ON ERROR (error end) and ERR_S UB0 (No RF Tag).

I: Confirm that the ERROR1 signal is 1 (ON), and then turn OFF TRG.

J: After confirming that TRG is OFF, the FL Remote ID turns OFF ERROR1 and ERR_SUB0.

Auto Mode with 100-ms Output Time

The timing chart for auto mode with a 100-ms output time is shown in the following figure.



A: The PLC turns ON INHIBIT and sends the execution command to the FL Remote ID.

B: The FL Remote ID checks that INHIBIT is ON, determines the CMD (command), LEN (data length), and ADDR (start address), and then turns ON BUSY.

C: The FL Remote ID starts communications with an RF Tag when one enters the Antenna's communications range.

D: The FL Remote ID turns ON NORMAL when communications with RF Tag end normally. For READ DATA, the read data is output to the FL Remote ID. For NOISE MEASUREMENT, the measurement data is output to the FL Remote ID.

E: The RF Tag moves outside the Antenna's communications range within 100 ms after the FL Remote result is output.

F: The result output is turned OFF 100 ms after the FL Remote ID result is output.
When measuring noise, the noise will be measured and the results will be output alternately while INHIBIT is OFF, regardless of whether there is an RF Tag present.

G: The FL Remote ID starts communications with RF Tag when it enters the Antenna's communications range.

H: The FL Remote ID turns ON NORMAL when communications with the RF Tag ends normally. For READ DATA, the read data is output to the FL Remote ID.

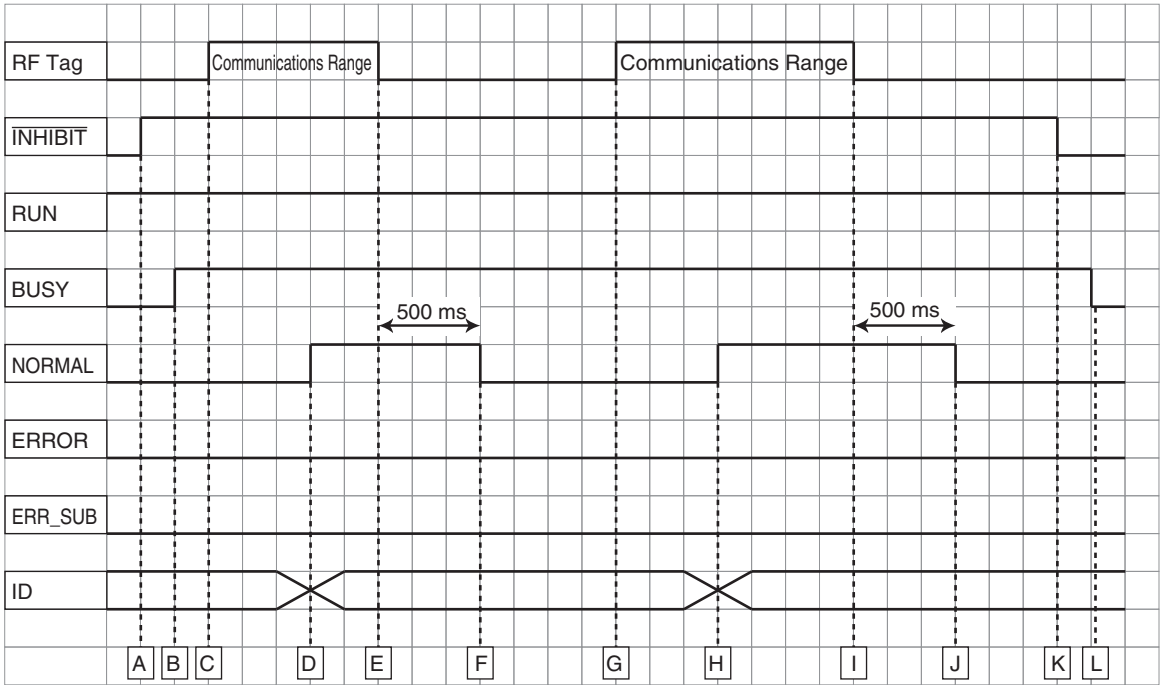
I: Result output is turned OFF when the RF Tag moves outside the Antenna's communications range 100 ms after the FL Remote ID result is output.

J: The PLC turns OFF INHIBIT to prevent command execution by the FL Remote ID.

K: The FL Remote ID confirms that INHIBIT is OFF, and then turns OFF BUSY.

Auto Mode (500 ms Output Time)

The timing chart for auto mode with a 500-ms output time is shown in the following figure.



A: The PLC turns ON $\overline{\text{INHIBIT}}$, and sends the execution command to the FL Remote ID.

B: The FL Remote ID checks that $\overline{\text{INHIBIT}}$ is ON, determines the CMD (command), LEN (data length), and ADDR (start address), and then turns ON BUSY.

C: The FL Remote ID starts communications with an RF Tag when one enters the Antenna's communications range.

D: The FL Remote ID turns ON NORMAL when communications with the RF Tag ends normally. For READ DATA, the read data is output to the FL Remote ID. For NOISE MEASUREMENT, the measurement data is output to the FL Remote ID.

E: The RF Tag moves out of the Antenna's communications range.

F: The FL Remote ID waits for the RF Tag to leave the Antenna's communications range, and then turns OFF the result output 500 ms afterward.
When measuring noise, the noise will be measured and the results will be output alternately while INHIBIT is OFF, regardless of whether there is an RF Tag present.

G: The FL Remote ID starts communications with the RF Tag when one enters the Antenna's communication range.

H: The FL Remote ID turns ON NORMAL when communications with the RF Tag is finished. For READ DATA, the read data is output to the FL Remote ID.

I: The RF Tag moves outside the antenna's communication range.

J: The FL Remote ID waits for the RF Tag to move outside the Antenna's communications range, and then turns ON the result output 500 ms afterward.

K: The PLC sets $\overline{\text{INHIBIT}}$ to 0 (OFF) to prevent command execution by the FL Remote ID.

L: The FL Remote ID confirms that $\overline{\text{INHIBIT}}$ is OFF, and then turns OFF BUSY.

MEMO

SECTION 6
Troubleshooting

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Handling Errors

Check the error status by looking at the LED indicators and the error output, and then take suitable actions.

FL Remote-related Errors

Check the DEV and RMT indicators for errors relating to the FL Remote network and hardware.

■ DEV (Device Status)

		Error	Corrective action
	Lit red	Hardware error	If the error continues after resetting the power, replace the FL Remote ID.
	Flashing red	Settings error	Set the node address switches within the correct range.

■ RMT (Remote Status)

		Error	Corrective action
	Flashing green and red	Adding to link/Setting error	Review the link parameter settings.
	Lit red	Duplicate node address	Assign unique node addresses to all nodes within the same network.
	Flashing red	Leaving link	Check whether the communications cable is connected correctly. If noise enters on the communications cable, the node made leave the link. Take suitable noise countermeasures.

RFID-related Errors

When the ERROR indicator lights, check the LED indicators from bit 7 to bit 0 or the error output for errors relating to RFID, and then take suitable actions.

LED	Output bit	Error	Corrective action
Bit 0 Flashing red	Error End + RF Tag Missing Error	An RF Tag could not be detected in trigger mode.	Change the control timing so that communications can be started while the RF Tag is within the Antenna's communications range. Measure the noise and take suitable noise countermeasures. Check the effect of surrounding metal and make sure that the desired communications range can be obtained.
Bit 1 Flashing red	Error End + RF Tag Communications Error	RF Tag was detected in trigger mode but communications could not be ended normally.	Change the control timing so that communications can be started while the RF Tag is within the Antenna's communications range. Measure the noise and take suitable noise countermeasures. Check the effect of surrounding metal and make sure that the desired communications range can be obtained.
Bit 2 Flashing red	Error End + Address Error	The command specified a memory area outside the RF Tag memory range.	Set the command memory area within the RF Tag memory range.
Bit 3 Flashing red	Error End + Protection Error	The command specified data to be written to the write-protected area of RF Tag.	Set the command memory area to outside the write-protected area.
Bit 4 Flashing red	Error End + Mismatch Error	Data was not correctly written to RF Tag.	Retry the writing process. If the error persists, replace the RF Tag.
Bit 5 Flashing red	Error End + ID System Error 1	RF Tag used is not supported by the FL Remote ID.	Change the RF Tag to one supported by the FL Remote ID.
Bit 6 Flashing red	Error End + ID System Error 2		
Bit 7 Flashing red	Normal End + RF Tag Service Life Warning	The number of RF Tag overwrites exceeded the maximum number of overwrites.	Replace the RF Tag that had the RF Tag service life warning.

LED	Output bit	Error	Corrective action
Bit 0 and bit 4 Flashing red	Error End + Command Error	There is an error with the execution command, or the command cannot not be received.	Check the command, address, and number of bytes to process.
Bit 7 to bit 0 Flashing red	Error End + Switch Error	Mode switch setting error	Set the mode switch correctly.
Bit 7 to bit 0 Lit red	Error End + System Error	The FL Remote ID cannot operate.	If the error continues after resetting the power, replace the FL Remote ID.

Errors and Countermeasures

The four main causes of problems that may occur in the FL Remote ID are as follows:

- Noise interference · · · · · · · · · · · · · Take adequate countermeasures against noise.
- External device failure
- FL Remote ID failure
- Others

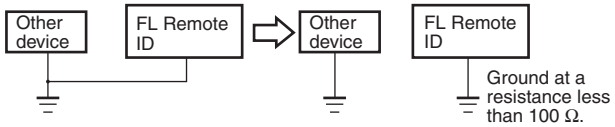
} · · · · · · Repairs are required.

■ Noise Interference

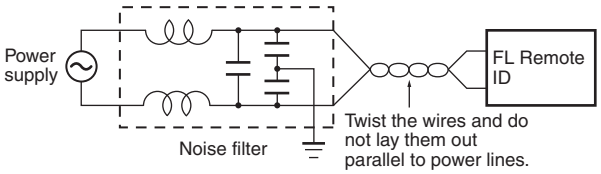
If the system malfunctions due to noise, refer to the following table and take appropriate countermeasures.

No.	Occurrence of fault	Possible cause	Countermeasure
1	Occurs when a heavy-duty motor, transformer, or capacitor is turned ON.	An instantaneous voltage drop due to inrush current to the heavy load.	Increase the capacity of the power supply and the size of the power cable.
		Common mode noise as a result of the above cause.	• Provide the power through a 1-to-1 non-grounded insulating transformer. • Do not use the same ground as other large-capacity devices. Independently ground the Controller at a resistance of 100 Ω or less. (See figure1.)
2	Occurs irregularly.	Noise on power line	Provide the power through a 1-to-1 non-grounded insulating transformer or noise filter. (See figure 2.)
3	Malfunction such as input signal turning ON when it should be OFF.	Inductive noise on input line	• Separate input signal from power lines. • If there is a lot of noise interference, put the input line inside a grounded metal conduit or use shielded cable.

1. Improvement in Grounding



2. Countermeasures Against Noise on Power Line



Maintenance and Inspection

The FL Remote ID must be inspected on a daily or regular basis so that the functions can be used in good condition. The FL Remote ID consists of semiconductors that last almost indefinitely. The following malfunctions may, however, result due to the operating environment and conditions.

(1) Element deterioration due to overvoltage or overcurrent.

(2) Element deterioration due to continuous stress caused by high ambient temperature.

(3) Connector contact faults or insulation deterioration due to humidity and dust.

(4) Connector contact faults or element corrosion due to corrosive gas.

■ Inspection Items

No.	Item	Detail	Criteria	Required equipment
1	Supply voltage fluctuation	(1) Check that the supply voltage fluctuation at the power supply terminal block is within the permissible range.	Within supply voltage specified range	Multimeter
		(2) Check that there are no frequent instantaneous power failures or radical voltage fluctuations.	Within permissible voltage fluctuation range	Power supply analyzer
2	Ambient environment (a) Temperature (b) Humidity (c) Vibration and shock (d) Dust (e) Corrosive gas	 (a) Within the specified range (b) Within the specified range (c) Influence of vibration or impact of machines (d) Check that the system is free of accumulated dust and foreign particles. (e) Check that no metal part of the system is discolored or corroded.	 (a) –10 to 55°C (b) 25% to 85% (c) Within the specified range (d) Neither is permitted. (e) Neither is permitted.	Maximum and minimum thermometer Hygrometer
3	Panel condition (a) Ventilation (b) Damage to packing for any enclosed construction	 (a) Check that the system is ventilated properly with natural ventilation, forced ventilation, or cooling air. (b) Check that the panel packing is properly attached with no damage.	 (a) The interior temperature must be within a range between –10 and 55°C with proper ventilation. (b) The packing must have no damage.	---
4	I/O power supply (a) Voltage fluctuation (b) Ripple	Check on the I/O terminal block that the voltage fluctuation and ripple are within the permissible ranges.	Within the specified range	Multimeter Oscilloscope
5	Mounting condition	(1) Check that each device is securely mounted.	No loose screws	---
		(2) Check that each connector is fully inserted.	Each connector must be locked or securely tightened with screws.	---
		(3) Check that no screw of the terminal block is loose.	No loose screws	---
		(4) Check that no wire is broken or nearly broken.	Must be no wire that is broken or nearly broken.	---
		(5) Check that the distance between the RF Tag and Antenna is within the specified range.	Within the specified range	---
6	RF Tag life	Use the RF Tag service life warning function and manage the number of times the RF Tag has been written.	Do not allow the specified maximum number of overwrites to be exceeded.	---

MEMO

SECTION 7
Appendices

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Specifications and Dimensions

FL Remote ID

■ General Specifications

V680-HAM42-FRT

Item	Specifications
Supply voltage (power consumption)	24 VDC +10%/−15% (6 W max)
Ambient operating temperature	−10 to 55°C (with no icing)
Ambient operating humidity	25% to 85% (with no condensation)
Ambient storage temperature	−25 to 65°C (with no icing)
Ambient storage humidity	25% to 85% (with no condensation)
Insulation resistance	20 MΩ min. (at 500 VDC) between all terminals together (excluding ground terminals) and ground terminals and between all terminals together (excluding ground terminals) and the casing
Dielectric strength	1,000 VAC (50/60 Hz) for 1 minute between all power supply terminals together (excluding ground terminals) and the casing 500 VAC (50/60 Hz) for 1 minute between all terminals together (excluding ground terminals) and the casing
Vibration resistance	10 to 150 Hz, 0.2-mm double amplitude at 15 m/s² in X, Y, and Z directions ten sweeps each for 8 minutes
Shock resistance	150 m/s² in X, Y, and Z directions 3 times each (18 times in total)
Dimensions	65 × 65 × 65 (W × H × D) mm (excluding protruding parts)
Degree of protection	Panel-mounting (conforms to IP20)
Material	PC/ABS resin
Weight	Approx. 150 g
Mounting method	DIN Track

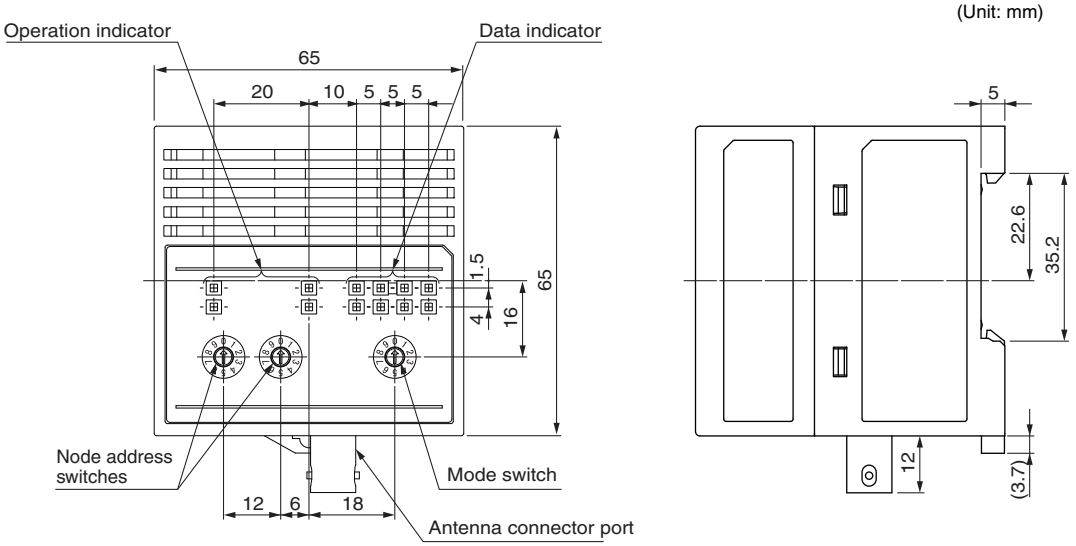
■ Communications Specifications

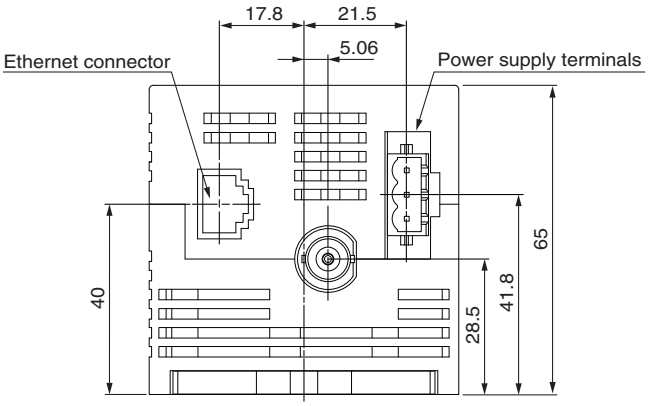
Item	Specifications
Communications protocol	FL-net Remote
Baud rate	Automatic switching between 10 Mbps/100 Mbps
Communications medium	FL-net Cable
Communications distance	Node to HUB 100 m max. HUB to HUB 100 m max. Node to node (one to one connection) 100 m max. Maximum extendable distance 200 m max. Note: The node may be either a Master or Slave.
Connection method	Switching hub
Node address	01 to 64 (select with switches)

■ Dimensions

V680-HAM42-FRT

(Unit: mm)





Case material	PC + ABS

Antenna

■ V680-HS51

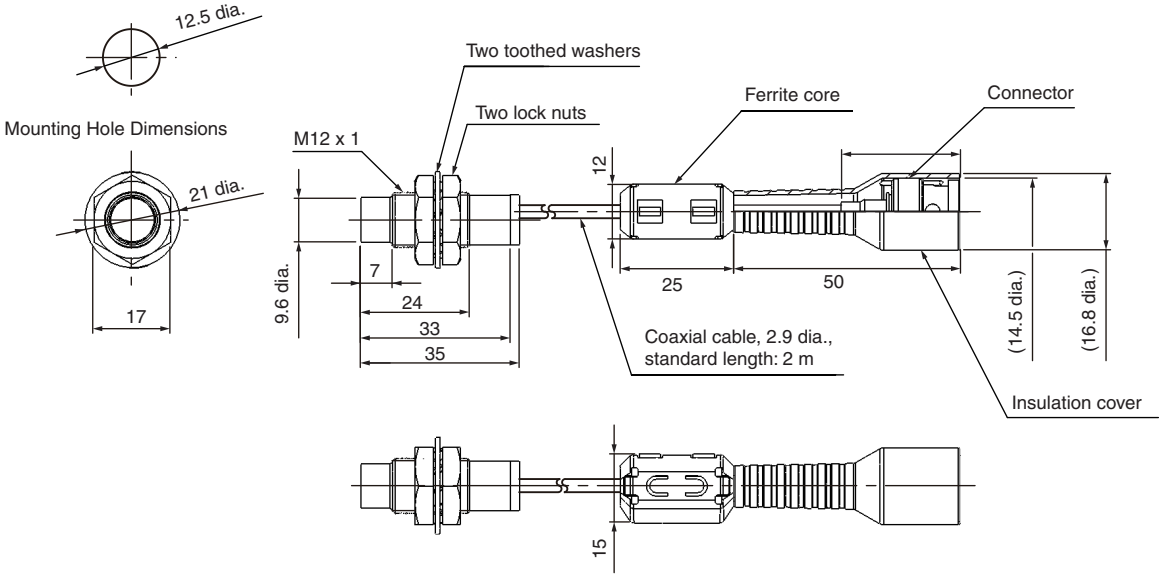
▪ General Specifications

Item / Model	V680-HS51
Ambient operating temperature	−10 to 60°C (with no icing)
Ambient storage temperature	−25 to 75°C (with no icing)
Ambient operating humidity	35% to 95% (with no condensation)
Insulation resistance	20 MΩ min. (at 500 VDC) between cable terminals and case
Dielectric strength	1,000 VAC, 50/60Hz for 1 min between cable terminals and case
Degree of protection	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) (Antenna portion)See Note1.
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s², 10 sweeps in each of 3 directions (up/down, left/right, and forward/backward) for 15 minutes each
Shock resistance	1,000 m/s², 3 times each in 6 directions (Total: 18 times)
Dimensions	M12 × 35 mm
Material	ABS, brass, and epoxy resin filling
Weight	Approx. 55 g
Cable length	Standard length of 2 m

Note.1 The Connector is not waterproof. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

■ Dimensions

(Unit: mm)



Case material	Brass
Communications surface	ABS resin
Fill resin	Epoxy resin
Cable	PVC (black)

■ V680-HS52-W/R

▪ General Specifications

Item / Model	V680-HS52-W (Standard cable, waterproof connector)	V680-HS52-R (Flexible cable, non-waterproof connector)
Ambient operating temperature	−10 to 60°C (with no icing)	
Ambient storage temperature	−25 to 75°C (with no icing)	
Ambient operating humidity	35% to 95% (with no condensation)	
Insulation resistance	20 MΩ min. (at 500 VDC) between cable terminals and the case	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between cable terminals and case	
Degree of protection	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) (Antenna portion) See Note 1.	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) (Antenna portion)See Note 2.
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s², 1 sweep in each 3 directions (up/down, left/right, and forward/backward) for 8 minutes each	
Shock resistance	500 m/s², 3 times each in 6 directions (Total: 18 times)	
Dimensions	M22 × 65 mm	
Material	ABS resin, brass, and epoxy resin filler	
Weight	Approx. 850 g (with 12.5-m cable)	
Cable length	Standard lengths of 2 and 12.5 m	

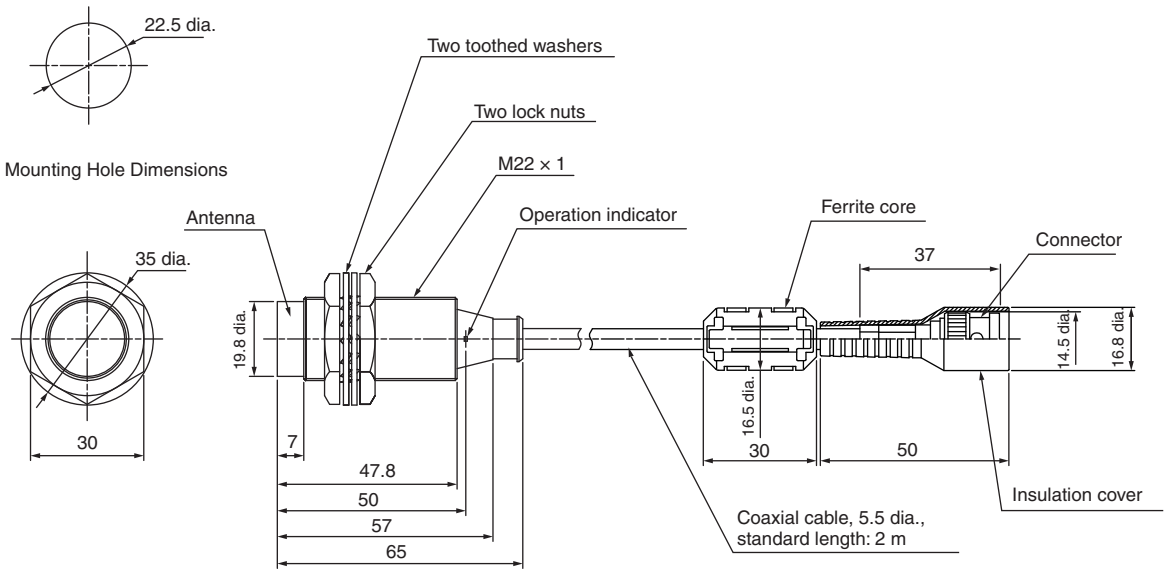
Note 1. The degree of protection for the Connector is IP67/IP65. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

2. The Connector is not waterproof. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

▪ Dimensions

V680-HS52-W

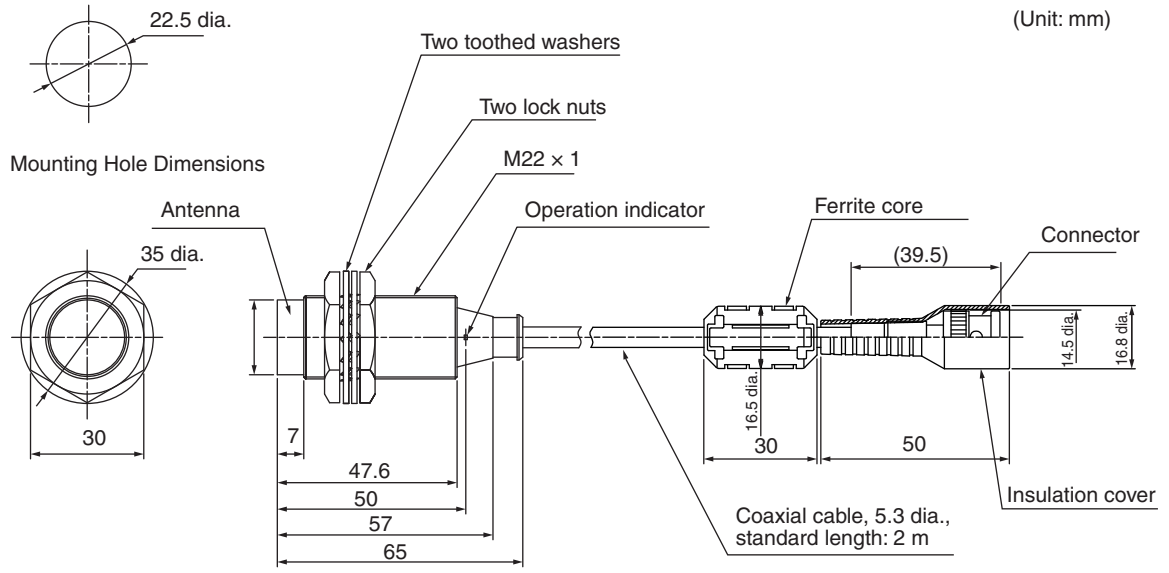
(Unit: mm)



Case material	Brass
Communications surface	ABS resin
Fill resin	Epoxy resin
Cable	PVC (gray)

V680-HS52-R

(Unit: mm)



Case material	Brass
Communications surface	ABS resin
Fill resin	Epoxy resin
Cable	PVC (black)

■ V680-HS63-W/R

▪ General Specifications

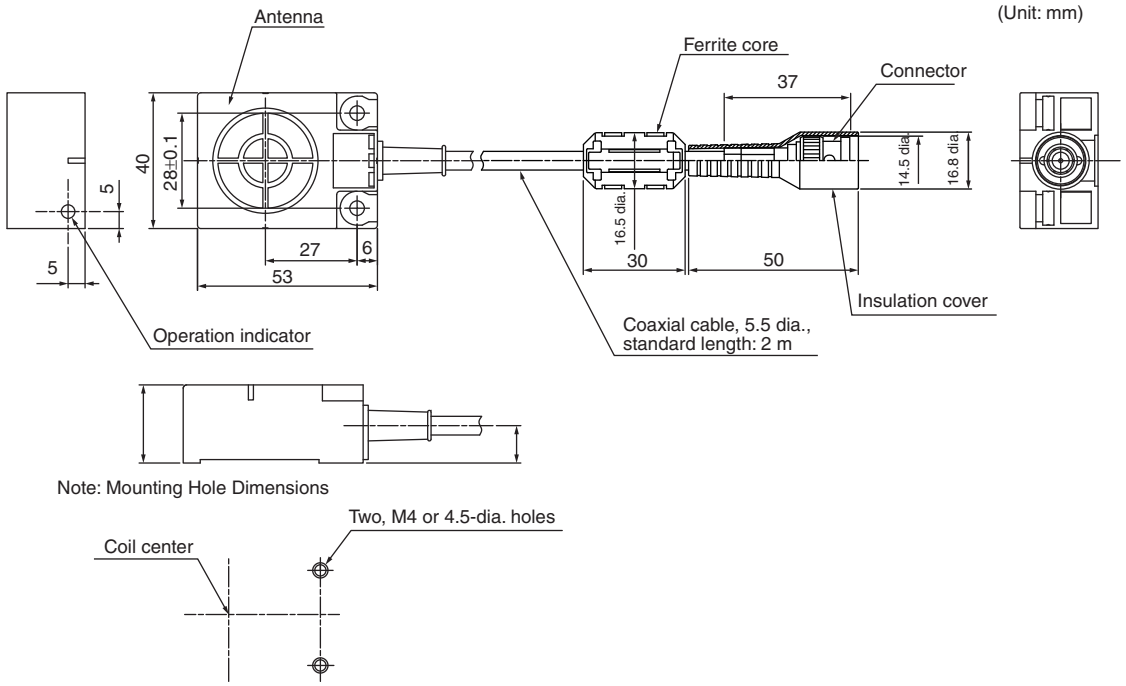
Item / Model	V680-HS63-W (Standard cable, waterproof connector)	V680-HS63-R (Flexible cable, non-waterproof connector)
Ambient operating temperature	−10 to 60°C (with no icing)	
Ambient storage temperature	−25 to 75°C (with no icing)	
Ambient operating humidity	35% to 95% (with no condensation)	
Insulation resistance	20 MΩ min. (at 500 VDC) between cable terminals and case	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between cable terminals and case	
Degree of protection	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) (Antenna portion) See Note 1.	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) (Antenna portion) See Note 2.
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s², 10 sweeps in each of 3 directions up/down, left/right, and forward/backward) for 11 minutes each	
Shock resistance	500 m/s², 3 times each in 6 directions (Total: 18 times)	
Dimensions	40 × 53 × 23 mm	
Material	ABS resin case, epoxy resin filler	
Weight	Approx. 850 g (with 12.5-m cable)	
Cable length	Standard lengths of 2 and 12.5 m	

Note 1. The degree of protection for the Connector is IP67/IP65. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

2. The Connector is not waterproof. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

▪ Dimensions

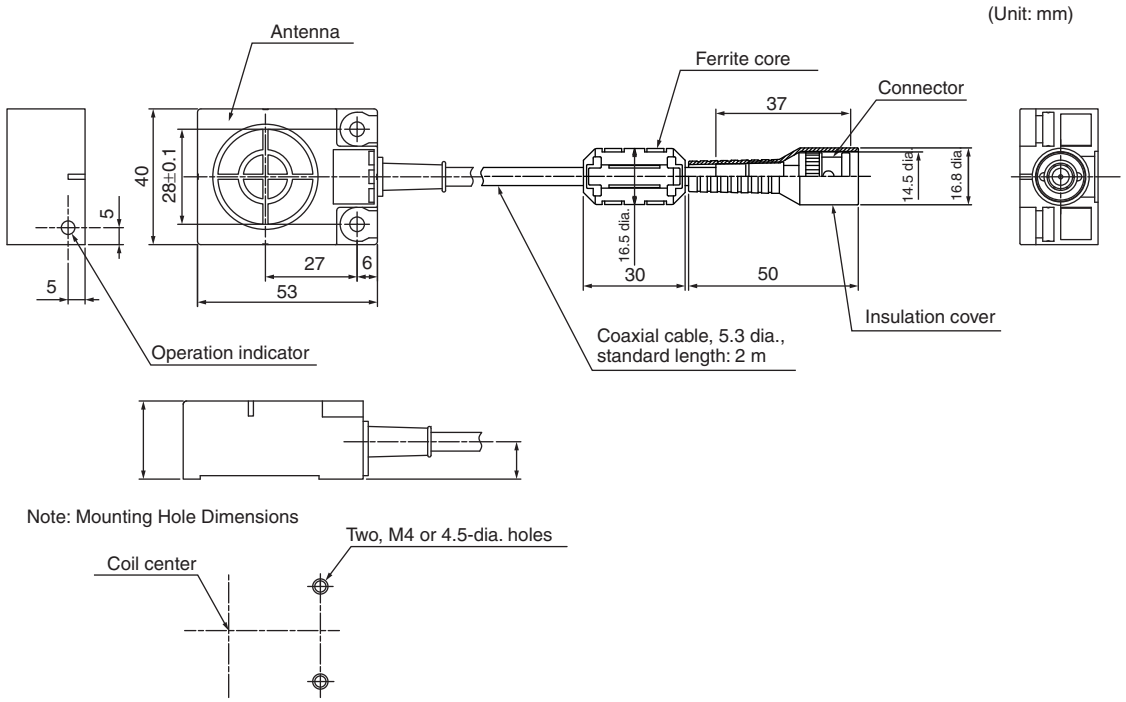
V680-HS63-W



Note: Mounting Hole Dimensions

Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (gray)

V680-HS63-R



Note: Mounting Hole Dimensions

Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (black)

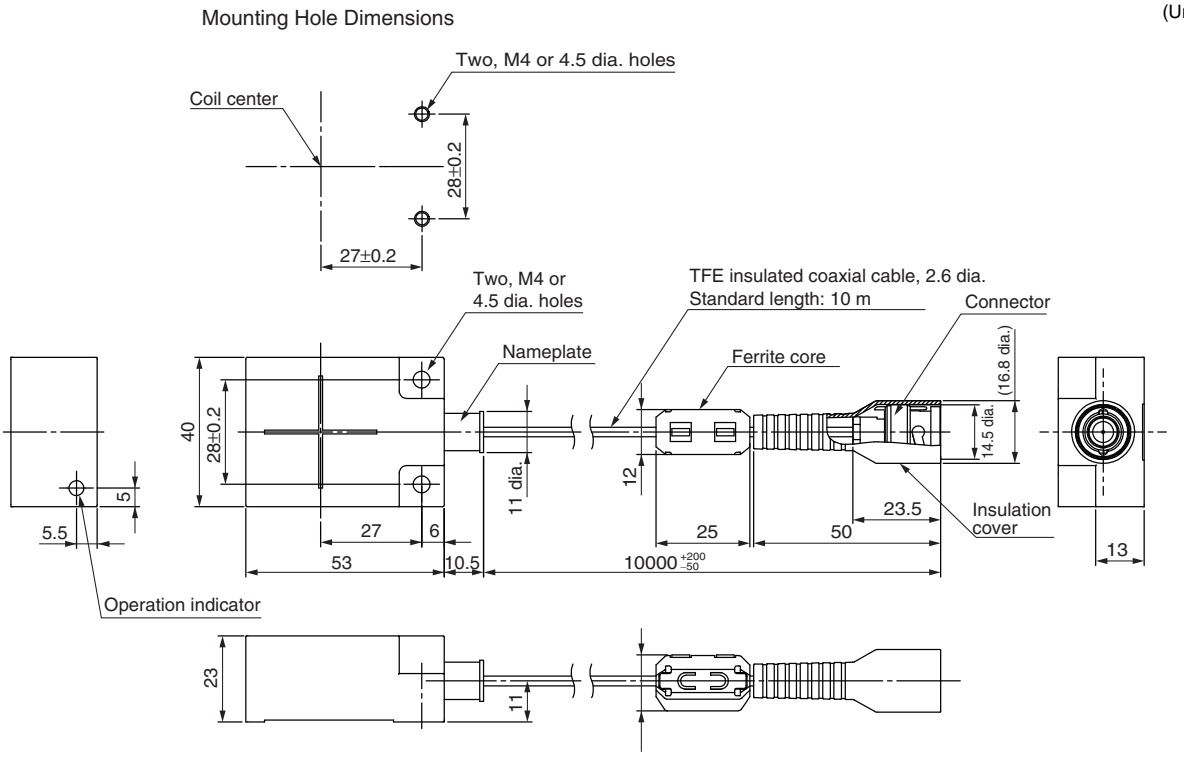
■ V680-HS63-SP

▪ General Specifications

Item	Specifications
Ambient operating temperature	−10 to 60°C (with no icing)
Ambient operating humidity	35% to 95% (with no condensation)
Ambient storage temperature	−25 to 75°C (with no icing)
Ambient storage humidity	35% to 95% (with no condensation)
Insulation resistance	20 MΩ min. (at 500 VDC) between power supply terminals and casing
Dielectric strength	1,000 VAC, 50/60Hz for 1 min between cable terminals and case
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude at 100 m/s² in X, Y, and Z directions ten sweeps each for 11 minutes
Shock resistance	500 m/s², 3 times each in 6 directions (Total: 18 times)
Dimensions	40 × 53 × 23 (W × H × D) mm (excluding protruding parts)
Degree of protection	IP67 (excluding connector section)
Material	Case: Fluororesin (PTFE) Fill resin: Epoxy resin Cable: Fluororesin (FEP)
Cable length	10 m
Weight	Approx. 270 g
Mounting method	Two M4 screws

▪ Dimensions

(Unit: mm)



Case material	PTFE (fluororesin)
Fill resin	Epoxy resin
Cable	FEP (fluororesin)

■ V680-HS65-W/R

▪ General Specifications

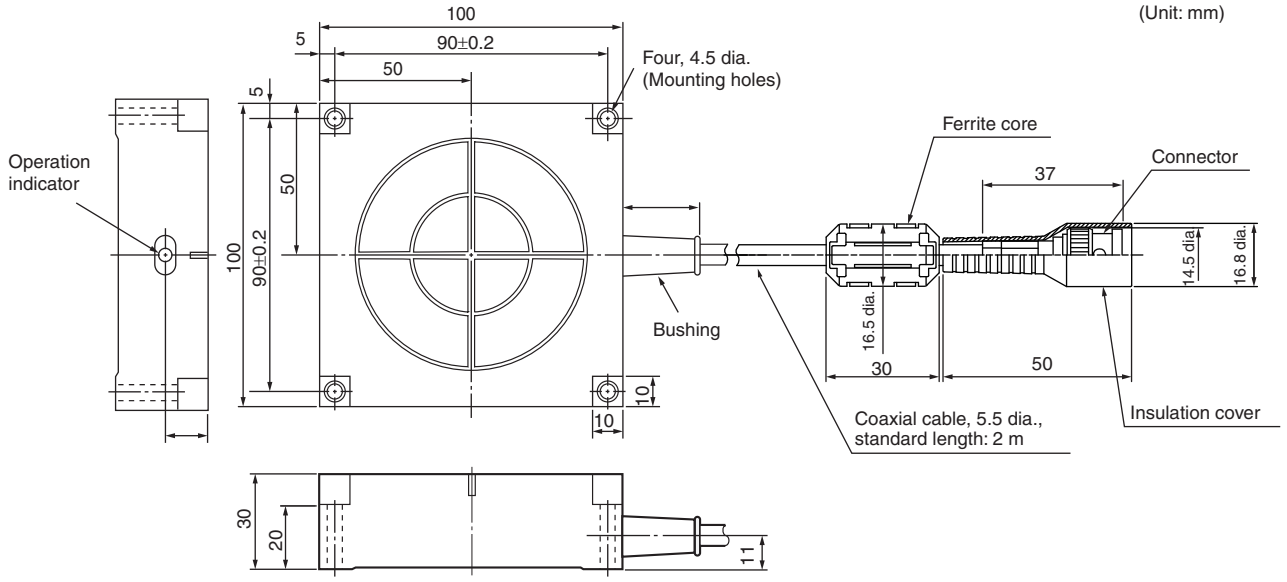
Item / Model	V680-HS65-W (Standard cable, waterproof connector)	V680-HS65-R (Flexible cable, non-waterproof connector)
Ambient operating temperature	−25 to 70°C (with no icing)	
Ambient storage temperature	−40 to 85°C (with no icing)	
Ambient operating humidity	35% to 95% (with no condensation)	
Insulation resistance	20 MΩ min. (at 500 VDC) between cable terminals and case	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between connector terminals and case	
Degree of protection	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) (Antenna portion) See Note 1.	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) (Antenna portion)See Note 2.
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s², 10 sweeps in each of 3 directions up/down, left/right, and forward/backward) for 11 minutes each	
Shock resistance	500 m/s², 3 times each in 6 directions (Total: 18 times)	
Dimensions	100 × 100 × 30 mm	
Material	ABS resin case, epoxy resin filler	
Weight	Approx. 1,100 g (with 12.5-m cable)	
Cable length	Standard lengths of 2 and 12.5 m	

Note 1. The degree of protection for the Connector is IP67/IP65. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

2. The Connector is not waterproof. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

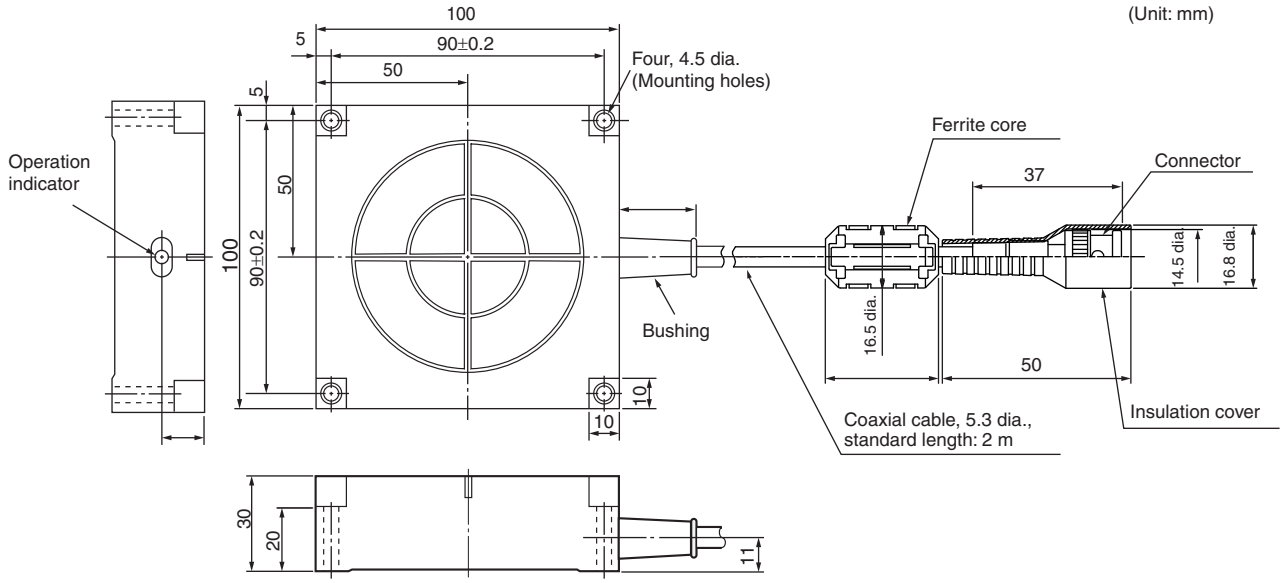
▪ Dimensions

V680-HS65-W



Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (gray)

V680-HS65-R



Case material	ABS resin
Fill resin	Epoxy resin
Cable	PVC (black)

RF Tags

■ V680-D1KP52MT

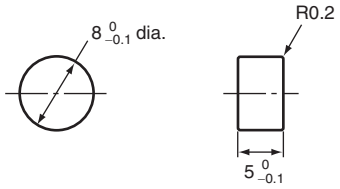
▪ General Specifications

Item / Model	V680-D1KP52MT
Memory capacity	1,000 bytes (user area)
Memory type	EEPROM
Data Retention	10 years after writing (85°C or less), 0.5 years after writing (85 to 125°C) Total data retention at high temperatures exceeding 125°C is 10 hours See Note 1
Write Endurance	100,000 times per block (25°C)
Ambient operating temperature when communicating	−25 to 85°C (with no icing)
Ambient storage temperature (with data retention)	−40 to 125°C (with no icing)
Ambient operating humidity	35% to 95%
Degree of protection	IP68 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) See Note 2.
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s^2, 10 sweeps each in X, Y, and Z directions for 15 minutes each
Shock resistance	500 m/s^2, 3 times each in X, Y, and Z directions (Total: 18 times)
Dimensions	8 dia. × 5 mm
Materials	Case: PPS resin, Filling resin: Epoxy resin
Weight	Approx. 0.5 g
Metal countermeasures	Yes

Note 1. After string data at high temperatures, rewrite the data even if changes are not required, high temperatures are those exceeding 125°C up to 180°C.

2. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

▪ Dimensions



(Unit: mm)

Case material	ABS resin
Fill resin	Epoxy resin

CHECK! When embedding the V680-D1KP52MT into a metal surface, use the V680-HS51/-HS52 Antenna. Communications will not be possible if the V680-HS63 Antenna is used.

CHECK! The side with the markings is the communications surface. Mount the RF Tag with this side facing the Antenna.

CHECK! The ID code is written in the memory of the RF Tag and may be affected by data retention characteristics at high temperatures. Take suitable precautions when using the READ ID command for RF Tags operating at high temperatures.

▪ RF Tag Heat Resistivity

- Storing RF Tags under high temperatures will adversely affect the performance of the internal parts and the service life of the RF Tags.
- An LTPD of 10% was determined during the evaluation for RF Tags that reached the end of their life after testing under the following test conditions.

Heat cycle	−10°C/150°C, 30 minutes each for 1,000 cycles
	−10°C/180°C, 30 minutes each for 200 cycles
High temperatures	150°C, 1,000 hours
	180°C, 200 hours

CHECK! LTPD: Lot tolerance percent defective
The lower limit of the malfunction rate for lots to be considered unacceptable during reliability testing.

■ V680-D1KP53M

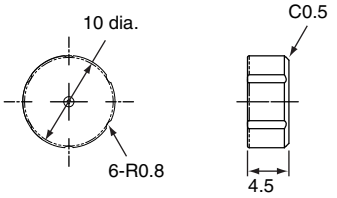
▪ General Specifications

Item / Model	V680-D1KP53M
Memory capacity	1,000 bytes (user area)
Memory type	EEPROM
Data Retention	10 years after writing (85°C or less), 0.5 years after writing (85 to 125°C) Total data retention at high temperatures exceeding 125°C is 10 houres See Note 1
Write Endurance	100,000 times per block (25°C)
Ambient operating temperature when communicating	–25 to 85°C (with no icing)
Ambient storage temperature (with data retention)	–40 to 125°C (with no icing)
Ambient operating humidity	35% to 95%
Degree of protection	IP68 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) See Note 2.
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s^2, 10 sweeps each in X, Y, and Z directions for 15 minutes each
Shock resistance	500 m/s^2, 3 times each in X, Y, and Z directions (Total: 18 times)
Dimensions	10 dia. × 4.5 mm (DIN698373)
Materials	Case: PPS resin, Filling resin: Epoxy resin
Weight	Approx. 1.0 g
Metal countermeasures	Yes

Note 1. After string data at high temperatures, rewrite the data even if changes are not required, high temperatures are those exceeding 125°C up to 180°C.

2. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

▪ Dimensions



Case material	PPS resin
Fill resin	Epoxy resin

CHECK! When embedding the V680-D1KP53M into a metal surface, use the V680-HS51, V680-HS52 Antenna. Transmission will not be possible if the V680-HS63 Antenna is used.

CHECK! The side with the markings is the communications surface. Mount the RF Tag with this side facing the Antenna.

■ V680-D1KP66T/-D1KP66MT

▪ General Specifications

Item / Model	V680-D1KP66T	V680-D1KP66MT
Memory capacity	1,000 bytes (user area)	
Memory type	EEPROM	
Data Retention	10 years after writing (85°C or less), 2.5 years after writing (85 to 125°C) Total data retention at high temperatures exceeding 125°C is 10 hours See Note 1	
Write Endurance	100,000 times per block (25°C)	
Ambient operating temperature	−25 to 85°C (with no icing)	
Ambient storage temperature (with data retention)	−40 to 125°C (with no icing)	
Ambient operating humidity	35% to 95%	
Degree of protection	IP68 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) See Note 2.	
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s², 10 sweeps each in X, Y, and Z directions for 15 minutes each	
Shock resistance	500 m/s², 3 times each in X, Y, and Z directions (Total: 18 times)	
Dimensions	34 × 34 × 3.5 mm	
Materials	Case: PPS resin	
Weight	Approx. 6 g	Approx. 7.5 g
Metal countermeasures	None	Yes

Note 1. After string data at high temperatures, rewrite the data even if changes are not required, high temperatures are those exceeding 125°C up to 180°C.

2. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

The V680-D1KP66MT is designed to be mounted directly to metal. The V680-D1KP66T and V680-D1KP66MT markings are shown in the following diagrams.

● V680-D1KP66MT

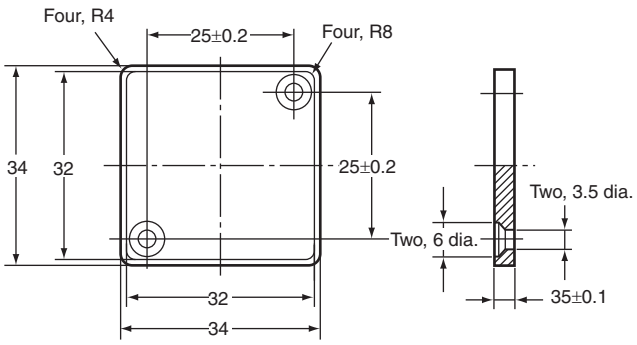
● V680-D1KP66T

CHECK!

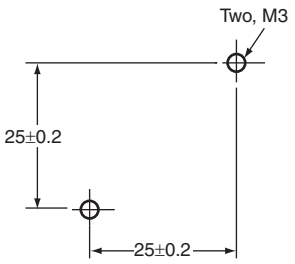
The side with the markings is the communications surface. Mount the RF Tag with this side facing the Antenna.

▪ Dimensions

V680-D1KP66T/-D1KP66MT



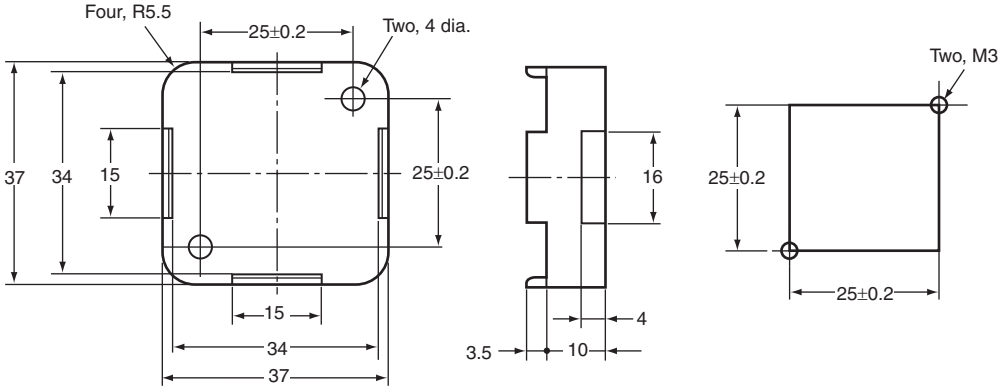
Mouting Hole Dimensions (Unit: mm)



Case material	PPS resin

V600-A86 Attachment

(Unit: mm)



Case material	PPS resin

▪ RF Tag Heat Resistivity

- Storing RF Tags under high temperatures will adversely affect the performance of the internal parts and the service life of the RF Tags.
- An LTPD of 10% was determined during the evaluation for RF Tags that reached the end of their life after testing under the following test conditions.

Heat cycle	−10°C/150°C, 30 minutes each for 1,000 cycles
	−10°C/180°C, 30 minutes each for 200 cycles
High temperatures	150°C, 1,000 hours
	180°C, 200 hours

CHECK!

LTPD: Lot tolerance percent defective
The lower limit of the malfunction rate for lots to be considered unacceptable during reliability testing.

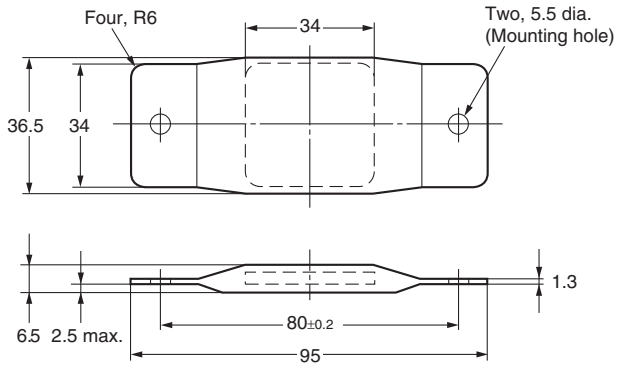
■ V680-D1KP66T-SP

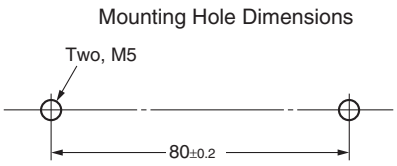
▪ General Specifications

Item	Specifications
Memory capacity	1,000 bytes
Memory type	EEPROM
Data Retention	10 years after writing (85°C or less)
Write Endurance	100,000 times per block (25°C)
Ambient operating temperature	When communicating: −25 to 70°C (with no icing) When not communicating: −40 to 110°C (with no icing)
Ambient operating humidity	35% to 95% (with no condensation)
Ambient storage temperature	−40 to 110°C (with no icing)
Ambient storage humidity	35% to 95% (with no condensation)
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude at 150 m/s² in X, Y, and Z directions ten sweeps each for 15 minutes
Shock resistance	500 m/s², 3 times each in X, Y, and Z directions (Total: 18 times)
Dimensions	95 × 36.5 × 6.5 (W × H × D) mm (excluding protruding parts)
Degree of protection	IP67
Material	External coating: Fluororesin (PFA) RF Tag body: PPS resin
Weight	Approx. 20 g
Mounting method	Two M5 screws

▪ Dimensions

(Unit: mm)





Case material	PFA resin

■ V680-D2KF52M

▪ General Specifications

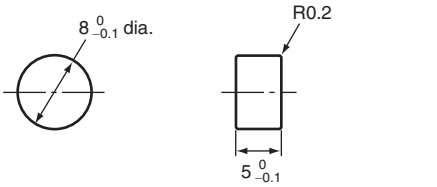
Item / Model	V680-D2KF52M
Memory capacity	2,000 bytes (user area)
Memory type	FRAM
Data Retention	10 years after writing (55°C or less), 2.9 years after writing (55 to 85°C)
Write Endurance	10 billion times per block (85°C or less). Access frequency See Note 1: 10 billion times
Ambient operating temperature	−25 to 85°C (with no icing)
Ambient storage temperature	−40 to 85°C (with no icing)
Ambient operating humidity	35% to 95%
Degree of protection	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) See Note 2.
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s², 10 sweeps each in X, Y, and Z directions for 15 minutes each
Shock resistance	500 m/s², 3 times each in X, Y, and Z directions (Total: 18 times)
Dimensions	8 dia. × 5 mm
Materials	Case: PPS resin, Filling resin: Epoxy resin
Weight	Approx. 0.5 g
Metal countermeasures	Yes

Note 1. The number of accesses is the total number of reads and writes.

2. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

▪ Dimensions

(Unit: mm)



Case material	PPS resin
Fill resin	Epoxy resin

CHECK!

When embedding the V680-D2KF52M into a metal surface, use the V680-HS51/-HS52 Antenna.
Communications will not be possible if the V680-HS63 Antenna is used.

CHECK!

The side with the markings is the communications surface. Mount the RF Tag with this side facing the Antenna.

■ V680-D8KF67/-D8KF67M

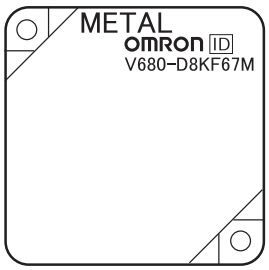
▪ General Specifications

Item / Model	V680-D8KF67	V680-D8KF67M
Memory capacity	8,192 bytes (user area)	
Memory type	FRAM	
Data Retention	10 years after writing (70°C max.), 6 years after writing (70 to 85°C)	
Write Endurance	10 billion times per block (85°C or less). Access frequency[See Note 1]: 10 billion times	
Ambient operating temperature	−20 to 85°C (with no icing)	
Ambient storage temperature	−40 to 85°C (with no icing)	
Ambient operating humidity	35% to 85%	
Degree of protection	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) [See Note 2.]	
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s^2,10 sweeps each in X, Y, and Z directions for 15 minutes each	
Shock resistance	500 m/s^2, 3 times each in X, Y, and Z directions (Total: 18 times)	
Dimensions	40 × 40 × 4.5 mm	
Materials	Case: PBT resin	
Weight	Approx. 8 g	Approx. 8.5 g
Metal countermeasures	None	Yes

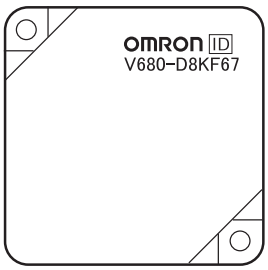
Note 1. The number of accesses is the total number of reads and writes.
2. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

The V680-D8KF67M is designed to be mounted directly to metal. The V680-D8KF67 and V680-D2KF67M markings are shown in the following diagrams.

● V680-D8KF67M



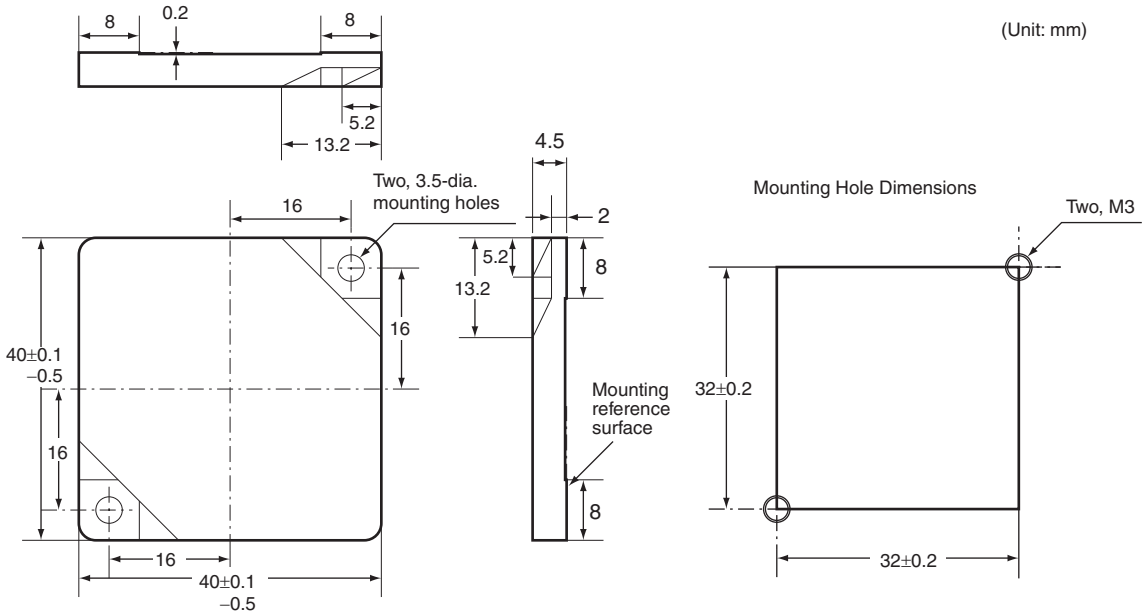
● V680-D8KF67



CHECK!

The side with the markings is the communications surface. Mount the RF Tag with this side facing the Antenna.

▪ Dimensions



Case material	PBT resin
Fill resin	Epoxy resin

■ V680-D8KF68/-D32KF68

▪ General Specifications

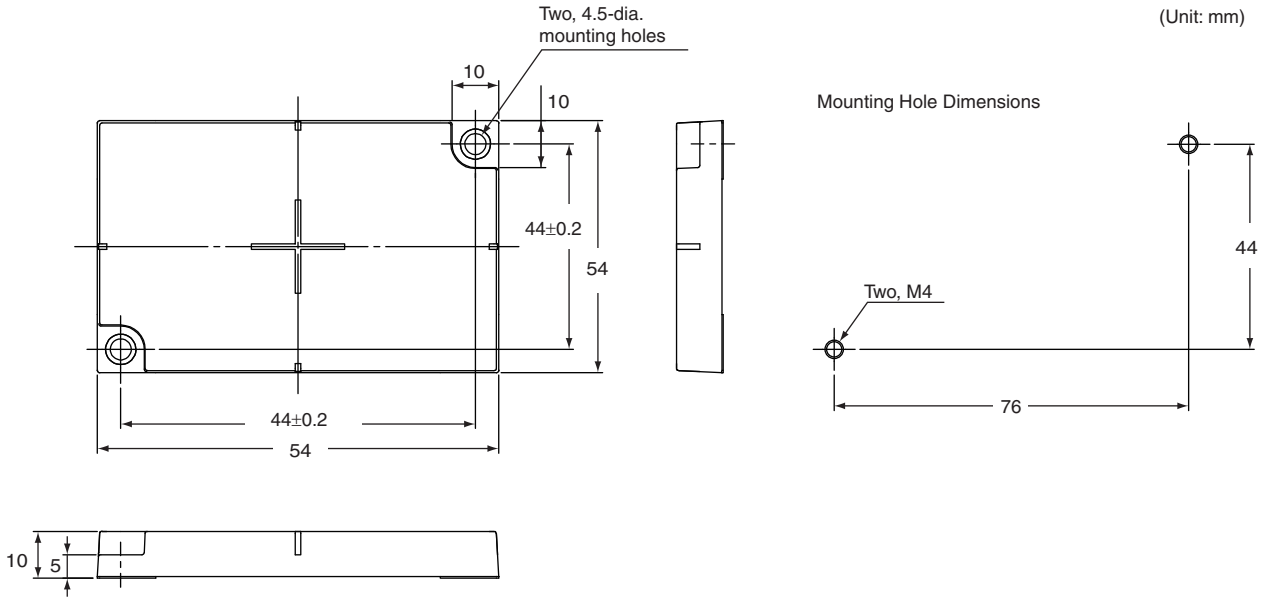
Item / Model	V680-D8KF68	V680-D32KF68
Memory capacity	8,192 bytes (user area)	32,744 bytes (user area)
Memory type	FRAM	
Data Retention	10 years after writing (70°C or less), 6 years after writing (70 to 85°C)	
Write Endurance	10 billion times per block (85°C or less) Access frequency[See Note 1]: 10 billion times	
Ambient operating temperature	−20 to 85°C (with no icing)	
Ambient storage temperature	−40 to 85°C (with no icing)	
Ambient operating humidity	35% to 85%	
Degree of protection	IP67 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) [See Note 2.]	
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s^2, 10 sweeps each in X, Y, and Z directions for 11 minutes each	
Shock resistance	500 m/s^2, 3 times each in X, Y, and Z directions (Total: 18 times)	
Dimensions	86 × 54 × 10 mm	
Materials	Case: PBT resin Filling resin: Epoxy resin	
Weight	Approx. 50 g	
Metal countermeasures	None	

Note 1. The number of accesses is the total number of reads and writes.

2. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

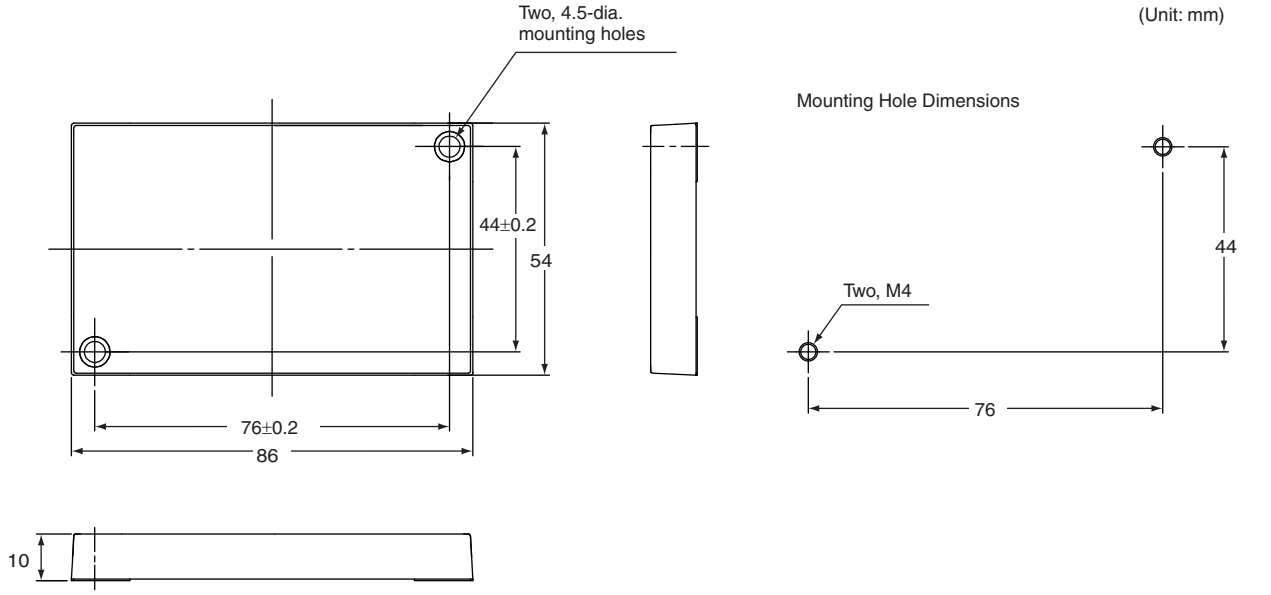
▪ General Specifications

V680-D8KF68/-D32KF68



Case material	PBT resin
Fill resin	Epoxy resin

V680-A81 Attachment



Case material	PBT resin
Fill resin	Epoxy resin

■ V680S-D2KF67/-D2KF67M/-D8KF67/-D8KF67M

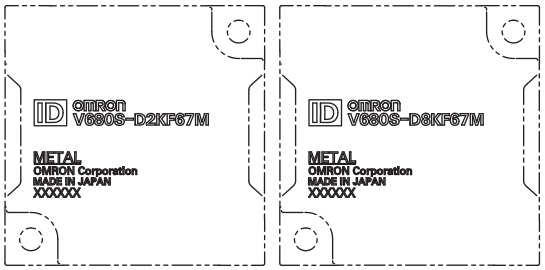
▪ General Specifications

Item / Model	V680S-D2KF67	V680S-D2KF67M	V680S-D8KF67	V680S-D8KF67M
Memory capacity	2,000 bytes (user area)		8,192 bytes (user area)	
Memory type	FRAM			
Data Retention	10 years after writing (85°C or less)			
Write Endurance	One trillion times per block (85°C or less). Access frequency[See Note 1.]: One trillion times			
Ambient operating temperature	−20 to 85°C (with no icing)			
Ambient storage temperature	−40 to 125°C (with no icing)			
Ambient operating humidity	35% to 85%			
Degree of protection	IP68 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) [See Note 2.] IPX9K (DIN 40 050)			
Vibration resistance	10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s^2,10 sweeps each in X, Y, and Z directions for 15 minutes each			
Shock resistance	500 m/s^2, 3 times each in X, Y, and Z directions (Total: 18 times)			
Dimensions	40 × 40 × 5 mm			
Materials	Case: PPS resin			
Weight	Approx. 11.5 g	Approx. 12 g	Approx. 11.5 g	Approx. 12 g
Metal countermeasures	None	Yes	None	Yes

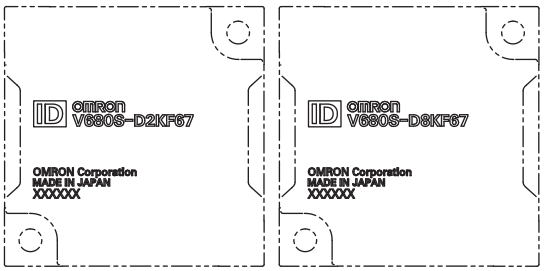
Note 1. The number of accesses is the total number of reads and writes.
2. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

The V680S-D2KF67M/-D8KF67M is designed to be mounted directly to metal. The V680S-D2KF67/-D2KF67M/-D8KF67 and V680S-D8KF67M markings are shown in the following diagrams.

● V680S-D2KF67M/-D8KF67M



● V680S-D2KF67-D8KF67

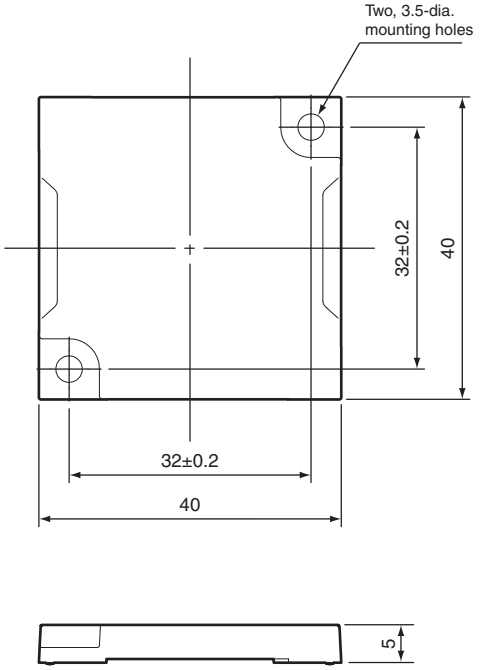


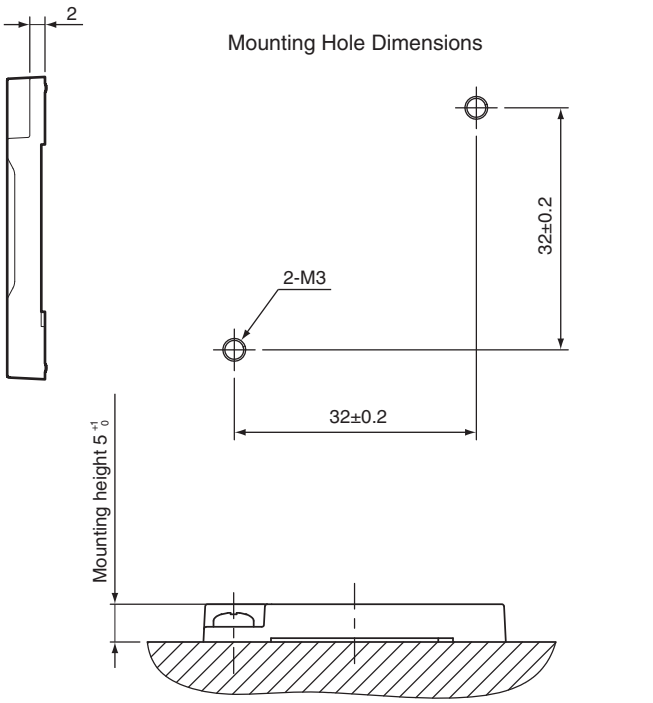
CHECK! The side with the markings is the communications surface. Mount the RF Tag with this side facing the Antenna.

CHECK! When using a V680S-D8KF67/-D8KF67M, to use the FL Remote ID production after October 2014.

▪ Dimensions

(Unit: mm)





Case material	PPS resin

■ V680S-D2KF68/-D2KF68M/-D8KF68/-D8KF68M

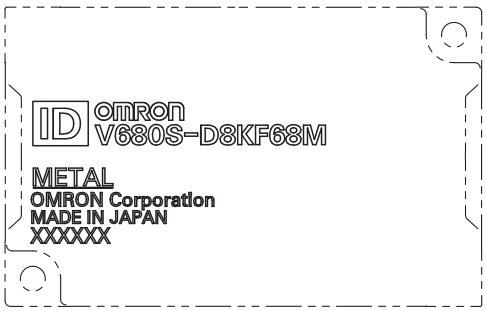
▪ General Specifications

Item / Model	V680S-D2KF68	V680S-D2KF68M	V680S-D8KF68	V680S-D8KF68M
Memory capacity	2,000 bytes (user area)		8,192 bytes (user area)	
Memory type	FRAM			
Data Retention	10 years after writing (85°C or less)			
Write Endurance	One trillion times per block (85°C or less) Access frequency[See Note 1.]: One trillion times			
Ambient operating temperature	−20 to 85°C (with no icing)			
Ambient storage temperature	−40 to 125°C (with no icing)			
Ambient operating humidity	35% to 85%			
Degree of protection	IP68 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) [See Note 2.] IPX9K (DIN 40 050)			
Vibration resistance	10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s², 10 sweeps each in X, Y, and Z directions for 11 minutes each			
Shock resistance	500 m/s², 3 times each in X, Y, and Z directions (Total: 18 times)			
Dimensions	86 × 54 × 10 mm			
Materials	Case: PPS resin			
Weight	Approx. 44 g	Approx. 46 g	Approx. 44 g	Approx. 46 g
Metal countermeasures	None	Yes	None	Yes

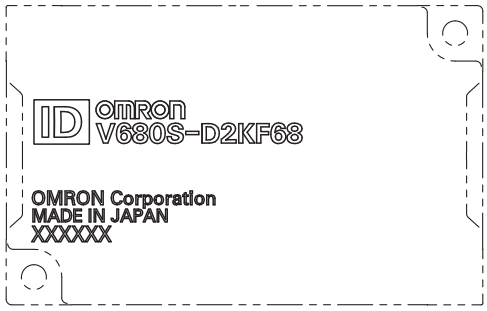
Note 1. The number of accesses is the total number of reads and writes.
2. Oil resistance has been tested using a specific oil as defined in the OMRON test method.

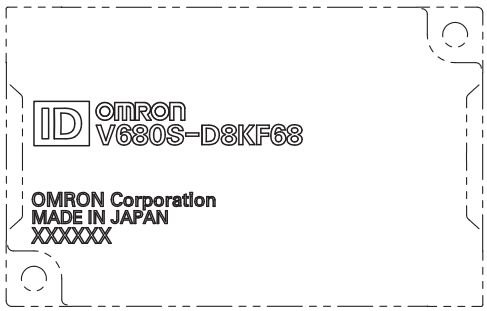
The V680S-D2KF68M/-D8KF68M is designed to be mounted directly to metal. The V680S-D2KF68/-D2KF68M/-D8KF68 and V680S-D8KF68M markings are shown in the following diagrams.

● V680S-D2KF68M/-D8KF68M



● V680S-D2KF68/-D8KF68



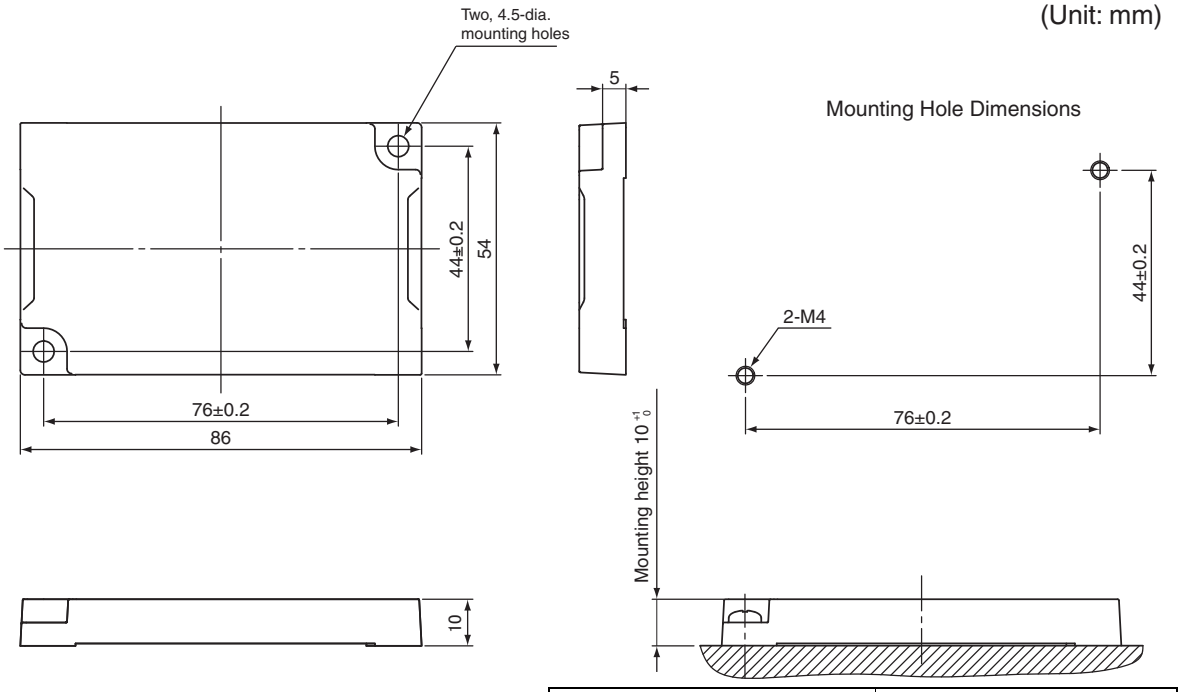


CHECK! The side with the markings is the communications surface. Mount the RF Tag with this side facing the Antenna.

CHECK! When using a V680S-D8KF68/-D8KF68M, to use the FL Remote ID production after October 2014.

▪ Dimensions

(Unit: mm)



Case material	PPS resin

Communications Range Specifications

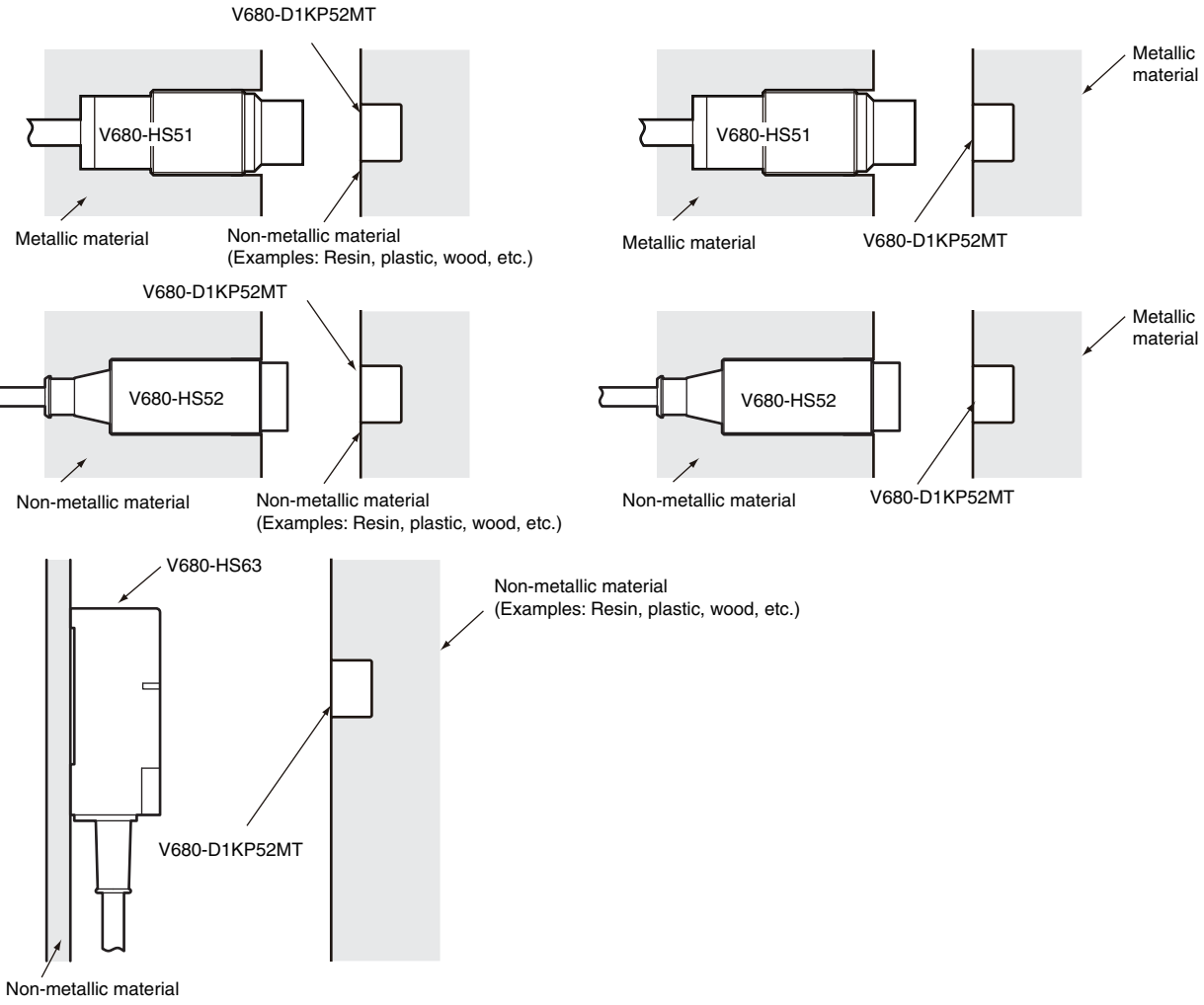
■ V680-D1KP52MT

Antenna	RF Tag	Communications range	
V680-HS51	V680-D1KP52MT	Read	0.5 to 6.5 mm (Axis offset: ±2)
		Write	0.5 to 6.0 mm (Axis offset: ±2)
	V680-D1KP52MT embedded in metal (steel)	Read	0.5 to 3.5 mm (Axis offset: ±2)
		Write	0.5 to 3.0 mm (Axis offset: ±2)
V680-HS52	V680-D1KP52MT	Read	0.5 to 9.0 mm (Axis offset: ±2)
		Write	0.5 to 8.5 mm (Axis offset: ±2)
	V680-D1KP52MT embedded in metal (steel)	Read	0.5 to 4.5 mm (Axis offset: ±2)
		Write	0.5 to 4.0 mm (Axis offset: ±2)
V680-HS63	V680-D1KP52MT	Read	0.5 to 12.0 mm (Axis offset: ±2)
		Write	0.5 to 9.5 mm (Axis offset: ±2)

CHECK!

When embedding the V680-D1KP52MT into a metal surface, use the V680-HS51/-HS52 Antenna. Transmission will not be possible if the V680-HS63 Antenna is used.

▪ Measurement Conditions



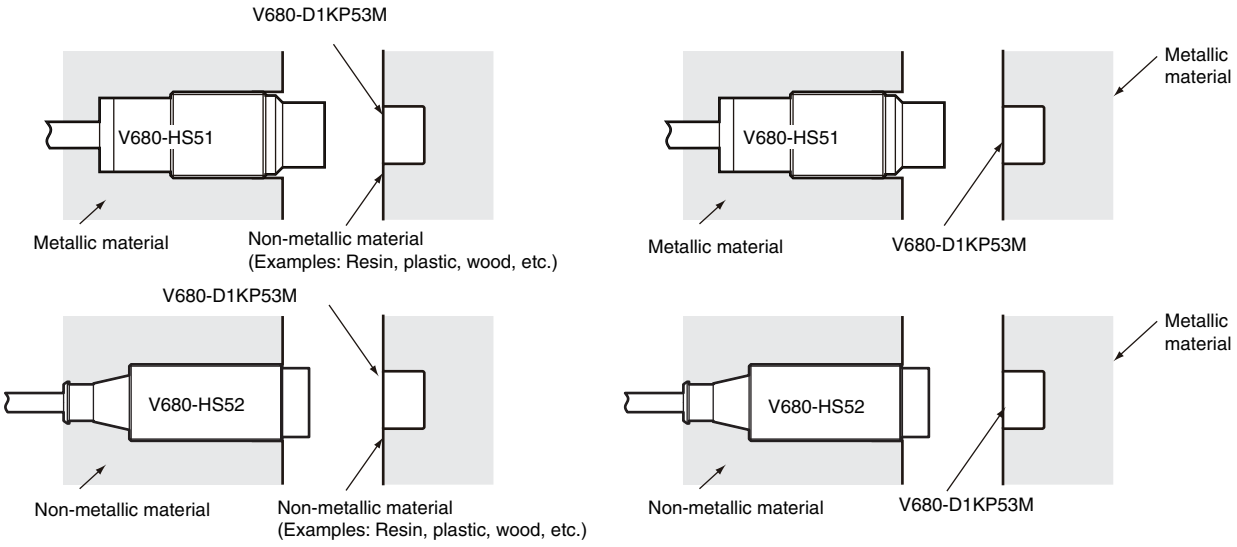
■ V680-D1KP53M

Antenna	RF Tag	Communications range	
V680-HS51	V680-D1KP53M	Read	0.5 to 6.5 mm (Axis offset: ±2)
		Write	0.5 to 6.0 mm (Axis offset: ±2)
	V680-D1KP53M embedded in metal (steel)	Read	0.5 to 3.5 mm (Axis offset: ±2)
		Write	0.5 to 3.0 mm (Axis offset: ±2)
V680-HS52	V680-D1KP53M	Read	0.5 to 9.0 mm (Axis offset: ±2)
		Write	0.5 to 8.5 mm (Axis offset: ±2)
	V680-D1KP53M embedded in metal (steel)	Read	0.5 to 4.5 mm (Axis offset: ±2)
		Write	0.5 to 4.0 mm (Axis offset: ±2)

CHECK!

When embedding the V680-D1KP53M into a metal surface, use the V680-HS51/-HS52 Antenna. Transmission will not be possible if the V680-HS63 Antenna is used.

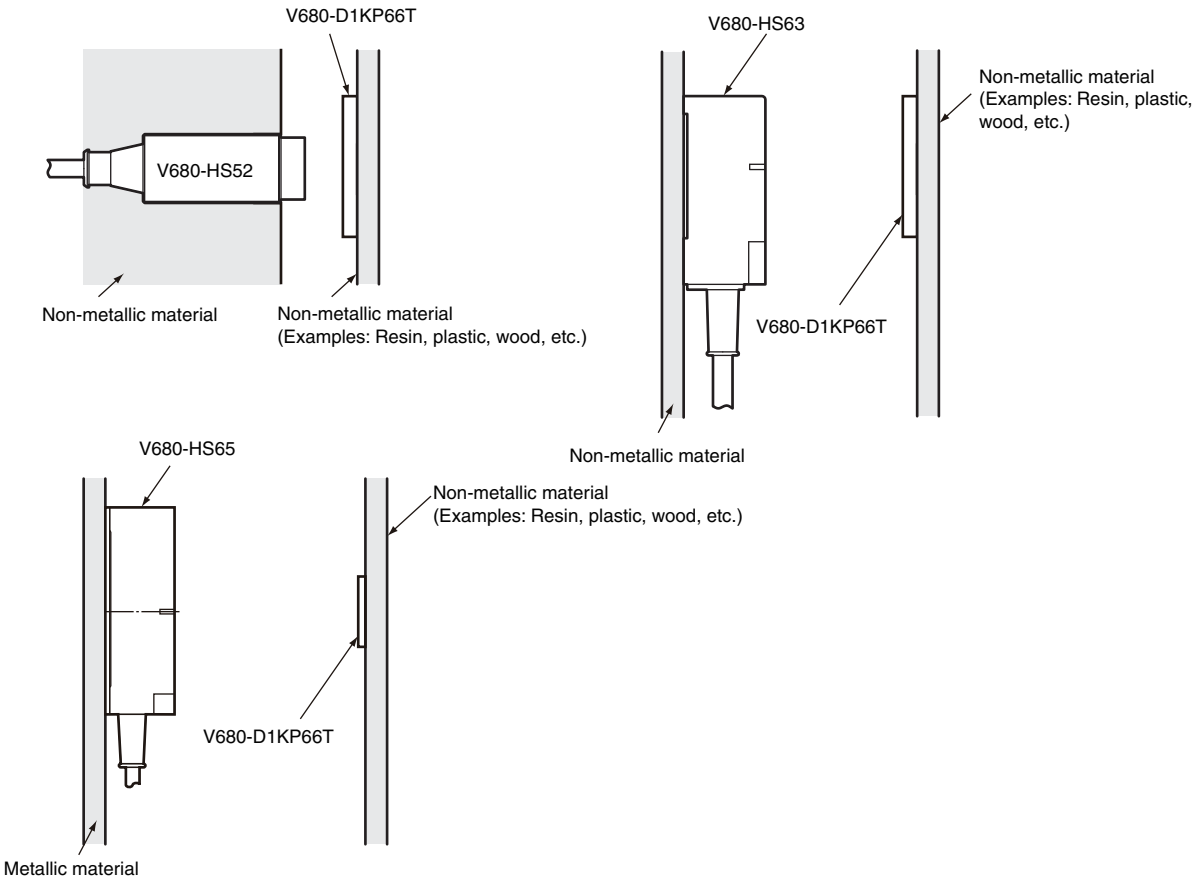
▪ Measurement Conditions



■ V680-D1KP66T

Antenna	RF Tag	Communications range	
V680-HS52	V680-D1KP66T	Read	1.0 to 17.0 mm (Axis offset: ±2)
		Write	1.0 to 17.0 mm (Axis offset: ±2)
V680-HS63	V680-D1KP66T	Read	5.0 to 30.0 mm (Axis offset: ±10)
		Write	5.0 to 25.0 mm (Axis offset: ±10)
V680-HS65	V680-D1KP66T	Read	5.0 to 47.0 mm (Axis offset: ±10)
		Write	5.0 to 42 mm (Axis offset: ±10)

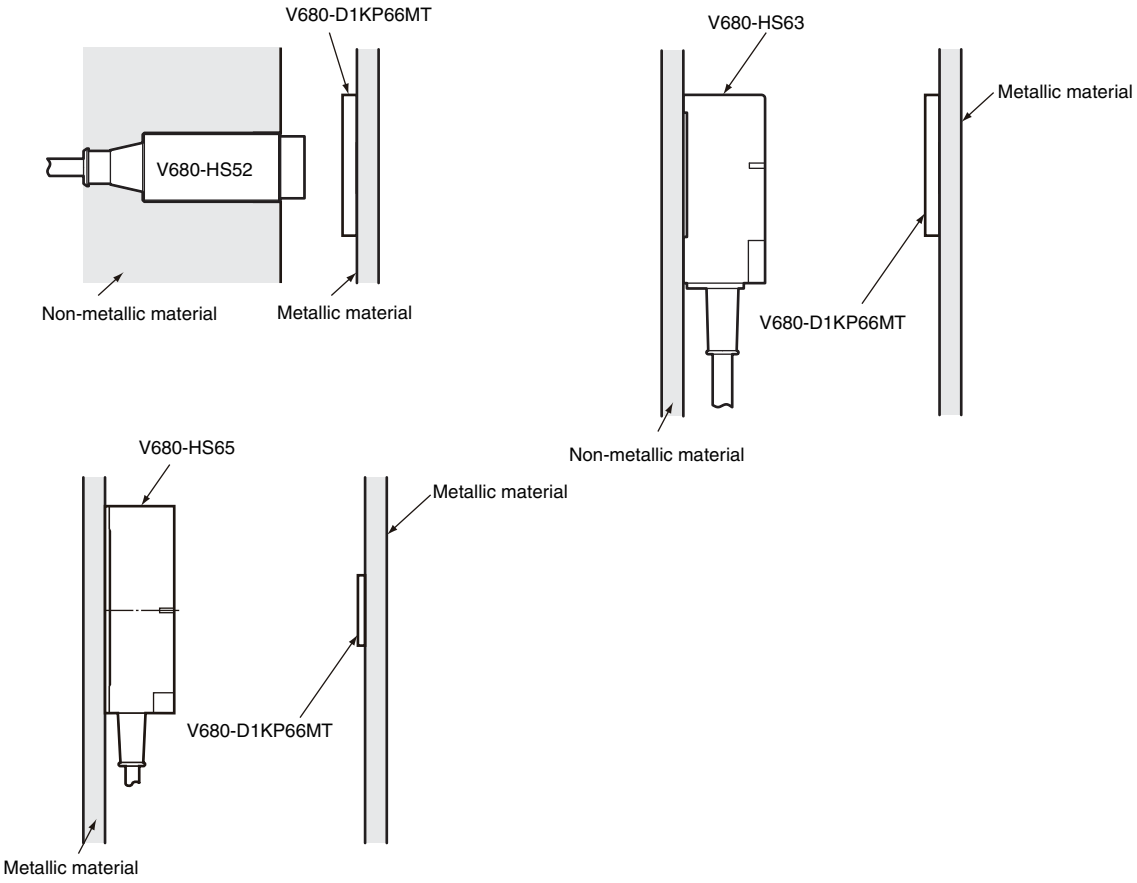
▪ Measurement Conditions



■ V680-D1KP66MT

Antenna	RF Tag	Communications range	
V680-HS52	V680-D1KP66MT embedded in metal (steel)	Read	1.0 to 16.0 mm (Axis offset: ±2)
		Write	1.0 to 14.0 mm (Axis offset: ±2)
V680-HS63	V680-D1KP66MT embedded in metal (steel)	Read	5.0 to 25.0 mm (Axis offset: ±10)
		Write	5.0 to 20.0 mm Axis offset: ±10)
V680-HS65	V680-D1KP66MT embedded in metal (steel)	Read	5.0 to 25.0 mm (Axis offset: ±10)
		Write	5.0 to 20.0 mm (Axis offset: ±10)

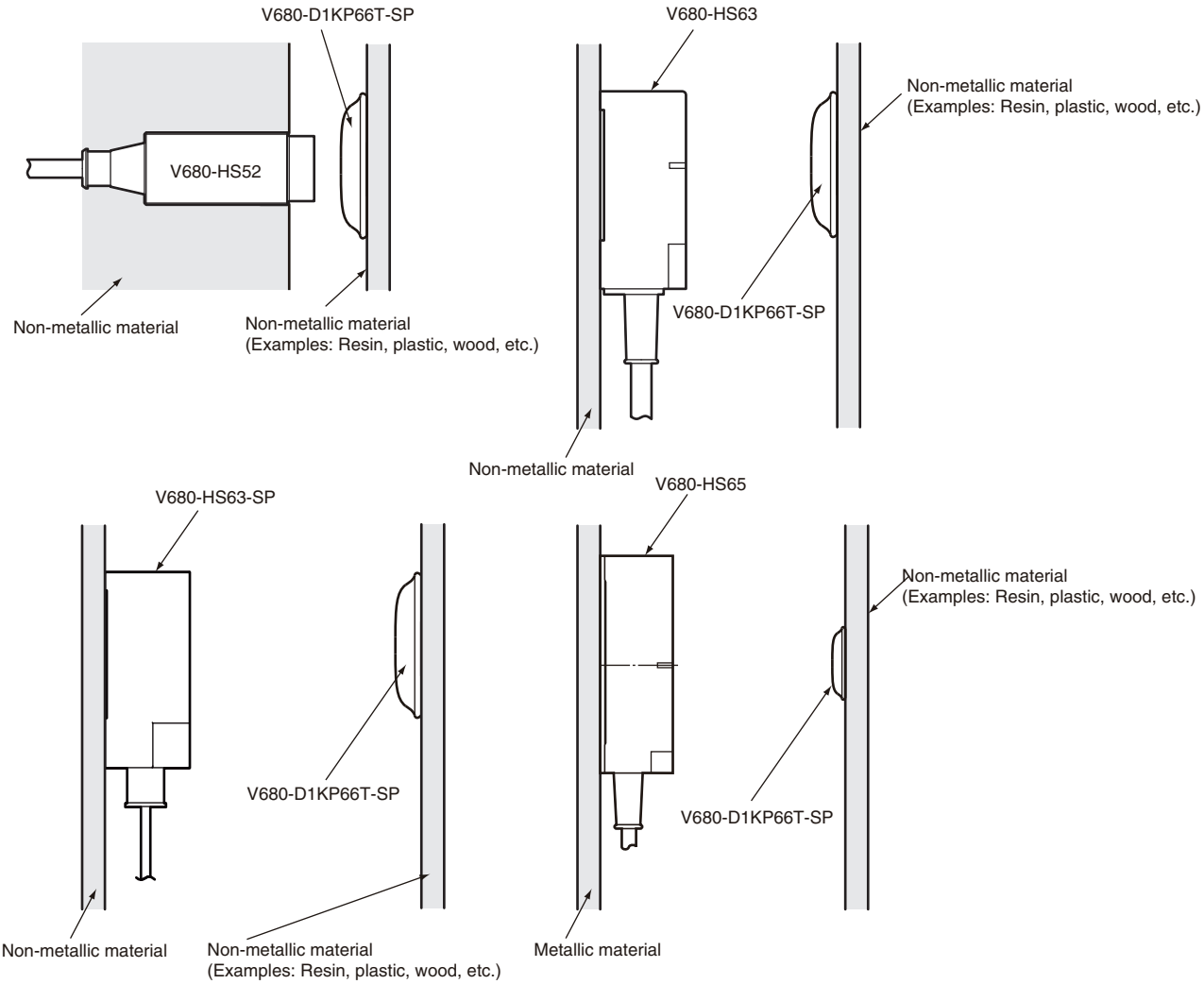
▪ Measurement Conditions



■ V680-D1KP66T-SP

Antenna	RF Tag	Communications range	
V680-HS52	V680-D1KP66T-SP	Read	1.0 to 15.0 mm (Axis offset: ±2)
		Write	1.0 to 15.0 mm (Axis offset: ±2)
V680-HS63	V680-D1KP66T-SP	Read	5.0 to 25.0 mm (Axis offset: ±10)
		Write	5.0 to 20.0 mm (Axis offset: ±10)
V680-HS63-SP	V680-D1KP66T-SP	Read	5.0 to 30.0 mm (Axis offset: ±10)
		Write	5.0 to 25.0 mm (Axis offset: ±10)
V680-HS65	V680-D1KP66T-SP	Read	5.0 to 42.0 mm (Axis offset: ±10)
		Write	5.0 to 37.0 mm (Axis offset: ±10)

▪ Measurement Conditions



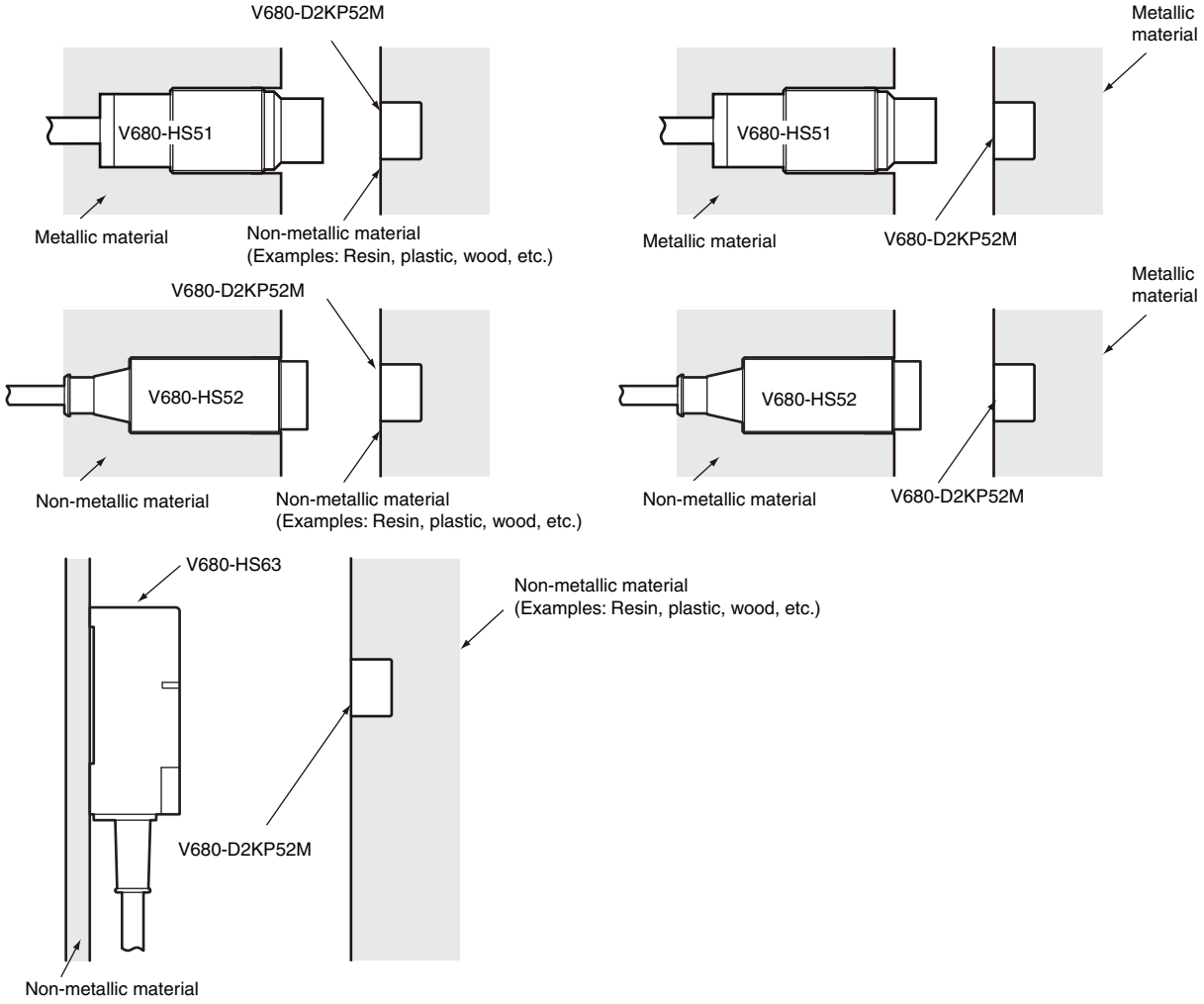
■ V680-D2KF52M

Antenna	RF Tag	Communications range	
V680-HS51	V680-D2KF52M	Read	0.5 to 5.5 mm (Axis offset: ±2)
		Write	0.5 to 5.5 mm (Axis offset: ±2)
	V680-D2KF52M embedded in metal (steel)	Read	0.5 to 3.5 mm (Axis offset: ±2)
		Write	0.5 to 3.5 mm (Axis offset: ±2)
V680-HS52	V680-D2KF52M	Read	0.5 to 8.0 mm (Axis offset: ±2)
		Write	0.5 to 8.0 mm (Axis offset: ±2)
	V680-D2KF52M embedded in metal (steel)	Read	0.5 to 3.0 mm (Axis offset: ±2)
		Write	0.5 to 3.0 mm (Axis offset: ±2)
V680-HS63	V680-D2KF52M	Read	0.5 to 9.5 mm (Axis offset: ±2)
		Write	0.5 to 9.5 mm (Axis offset: ±2)

CHECK!

When embedding the V680-D2KP52M into a metal surface, use the V680-HS51/-HS52 Antenna. Transmission will not be possible if the V680-HS63 Antenna is used.

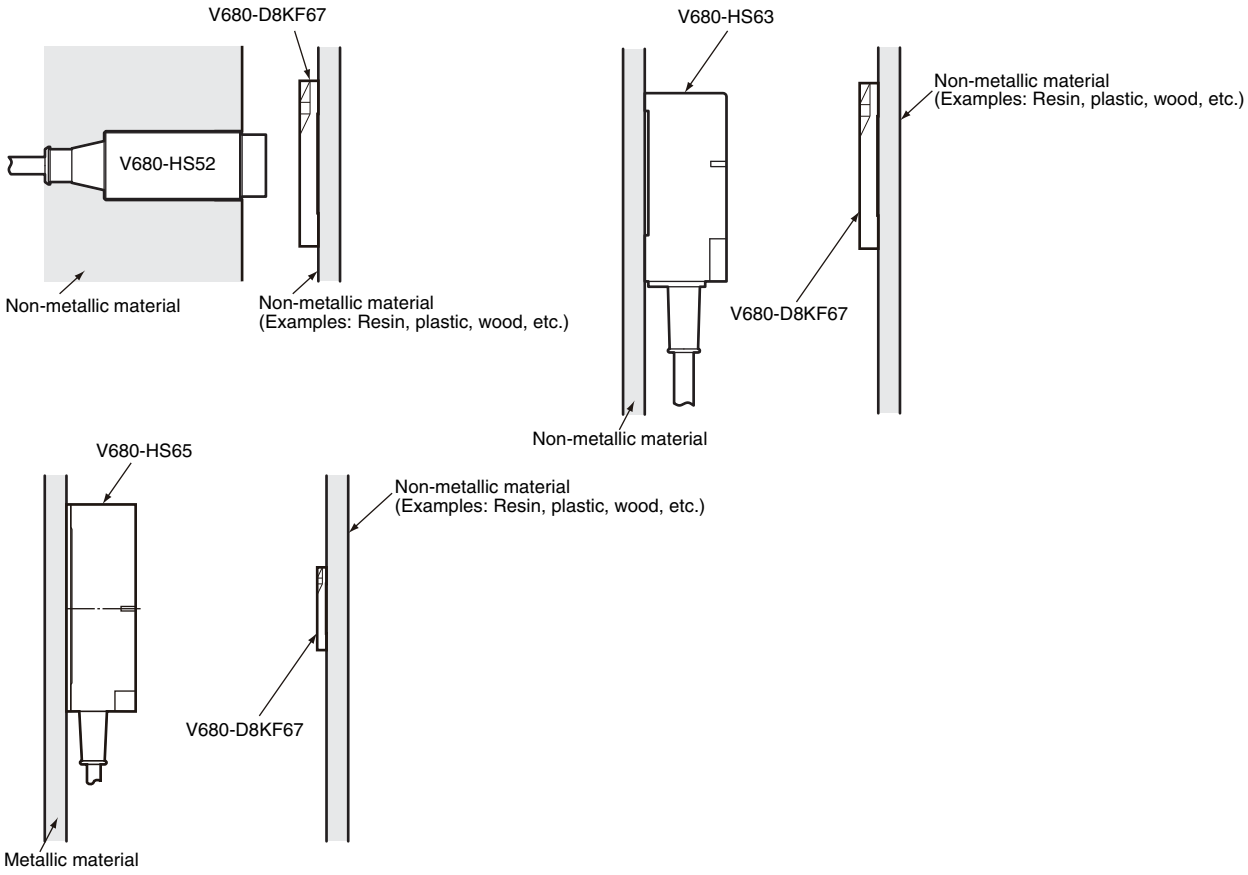
▪ Measurement Conditions



■ V680-D8KF67

Antenna	RF Tag	Communications range	
V680-HS52	V680-D8KF67	Read	0 to 17.0 mm (Axis offset: ±2)
		Write	0 to 17.0 mm (Axis offset: ±2)
V680-HS63	V680-D8KF67	Read	0 to 30.0 mm (Axis offset: ±10)
		Write	0 to 30.0 mm (Axis offset: ±10)
V680-HS65	V680-D8KF67	Read	0 to 42.0 mm (Axis offset: ±10)
		Write	0 to 42.0 mm (Axis offset: ±10)

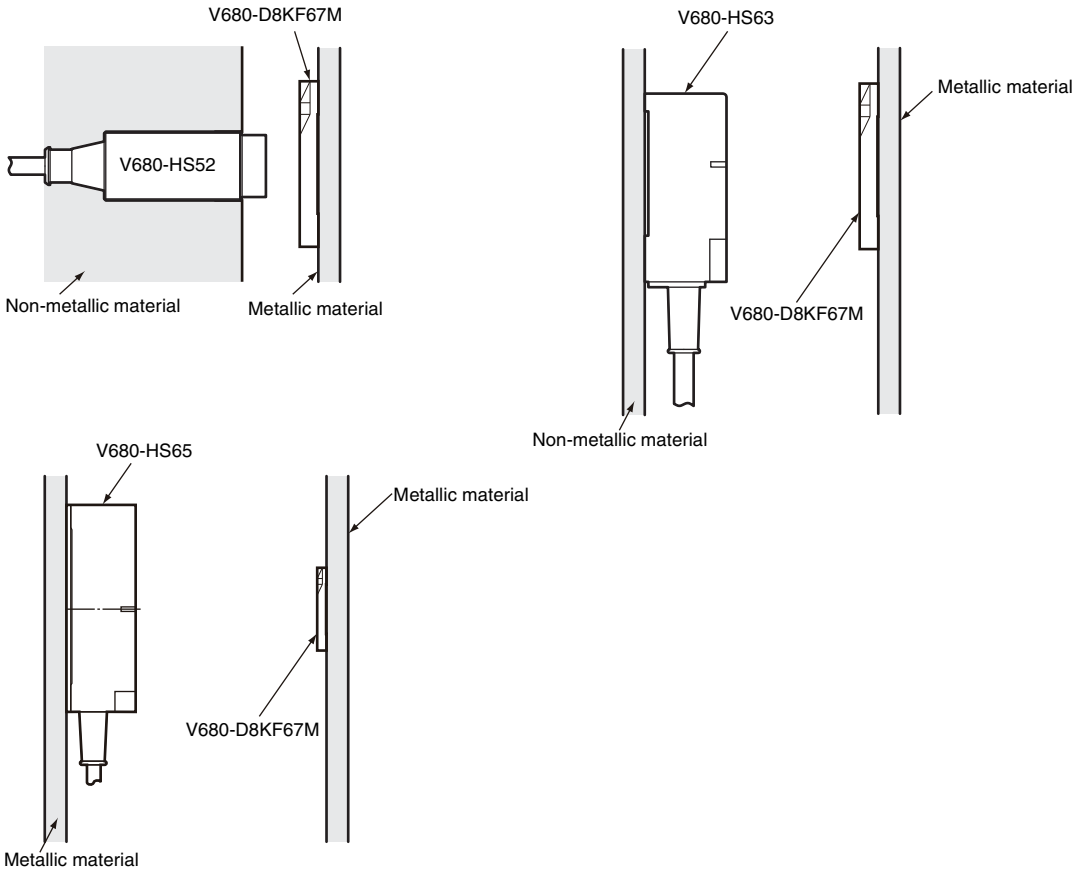
▪ Measurement Conditions



■ V680-D8KF67M

Antenna	RF Tag	Communications range	
V680-HS52	V680-D8KF67M with metal on back (steel)	Read	0 to 16.0 mm (Axis offset: ±2)
		Write	0 to 16.0 mm (Axis offset: ±2)
V680-HS63	V680-D8KF67M with metal on back (steel)	Read	0 to 25.0 mm (Axis offset: ±10)
		Write	0 to 25.0 mm (Axis offset: ±10)
V680-HS65	V680-D8KF67M with metal on back (steel)	Read	0 to 25.0 mm (Axis offset: ±10)
		Write	0 to 25.0 mm (Axis offset: ±10)

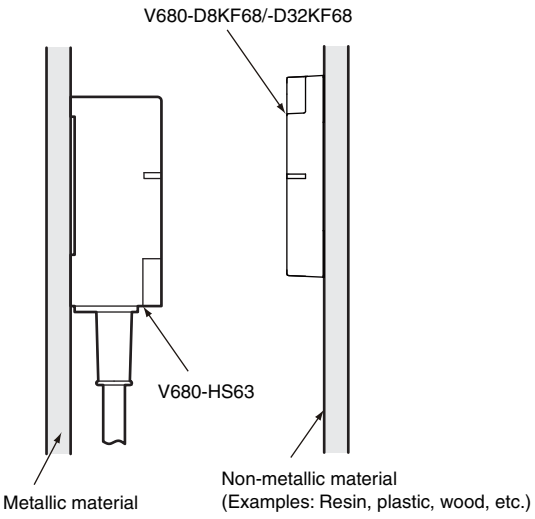
▪ Measurement Conditions

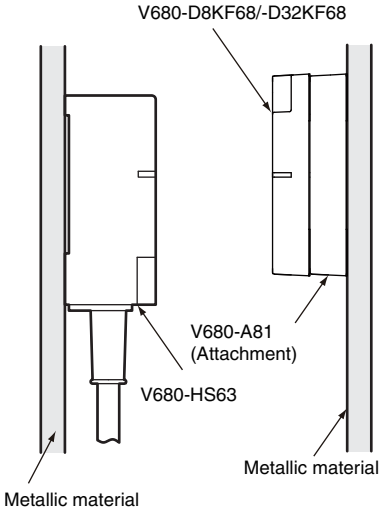


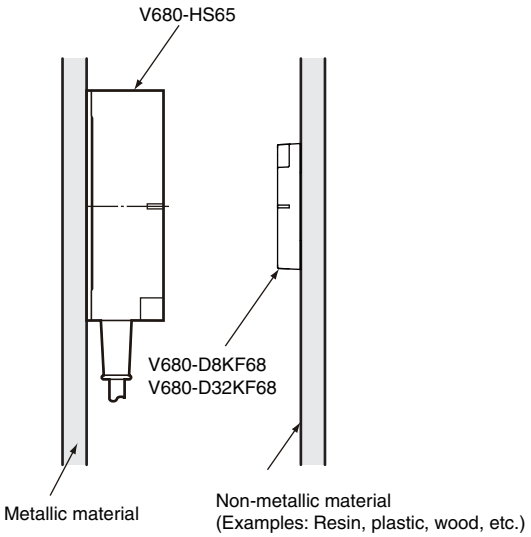
■ V680-D8KF68/-D32KF68

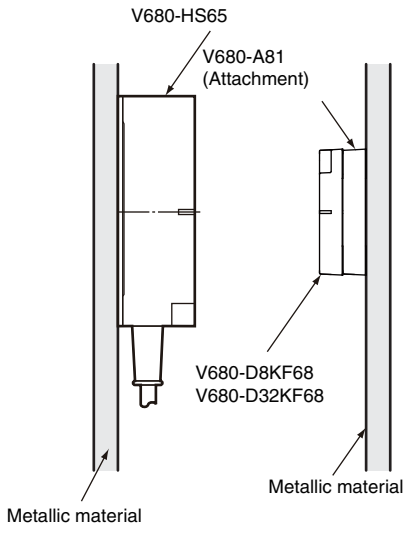
Antenna	RF Tag	Communications range	
V680-HS63	V680-D8KF68	Read	5.0 to 45.0 mm (Axis offset: ±10)
		Write	5.0 to 45.0 mm (Axis offset: ±10)
	V680-D8KF68 (with V680-A81 Attachment, V680-A81) with metal on back (steel)	Read	5.0 to 35.0 mm (Axis offset: ±10)
		Write	5.0 to 35.0 mm (Axis offset: ±10)
	V680-D32KF68	Read	5.0 to 45.0 mm (Axis offset: ±10)
		Write	5.0 to 45.0 mm (Axis offset: ±10)
	V680-D32KF68 (with Attachment, V680-A81) with metal on back (steel)	Read	5.0 to 35.0 mm (Axis offset: ±10)
		Write	5.0 to 35.0 mm (Axis offset: ±10)
V680-HS65	V680-D8KF68	Read	5.0 to 75.0 mm (Axis offset: ±10)
		Write	5.0 to 75.0 mm (Axis offset: ±10)
	V680-D8KF68 (with Attachment, V680-A81) with metal on back (steel)	Read	5.0 to 55.0 mm (Axis offset: ±10)
		Write	5.0 to 55.0 mm (Axis offset: ±10)
	V680-D32KF68	Read	5.0 to 75.0 mm (Axis offset: ±10)
		Write	5.0 to 75.0 mm (Axis offset: ±10)
	V680-D32KF68 (with Attachment, V680-A81) with metal on back (steel)	Read	5.0 to 55.0 mm (Axis offset: ±10)
		Write	5.0 to 55.0 mm (Axis offset: ±10)

▪ Measurement Conditions





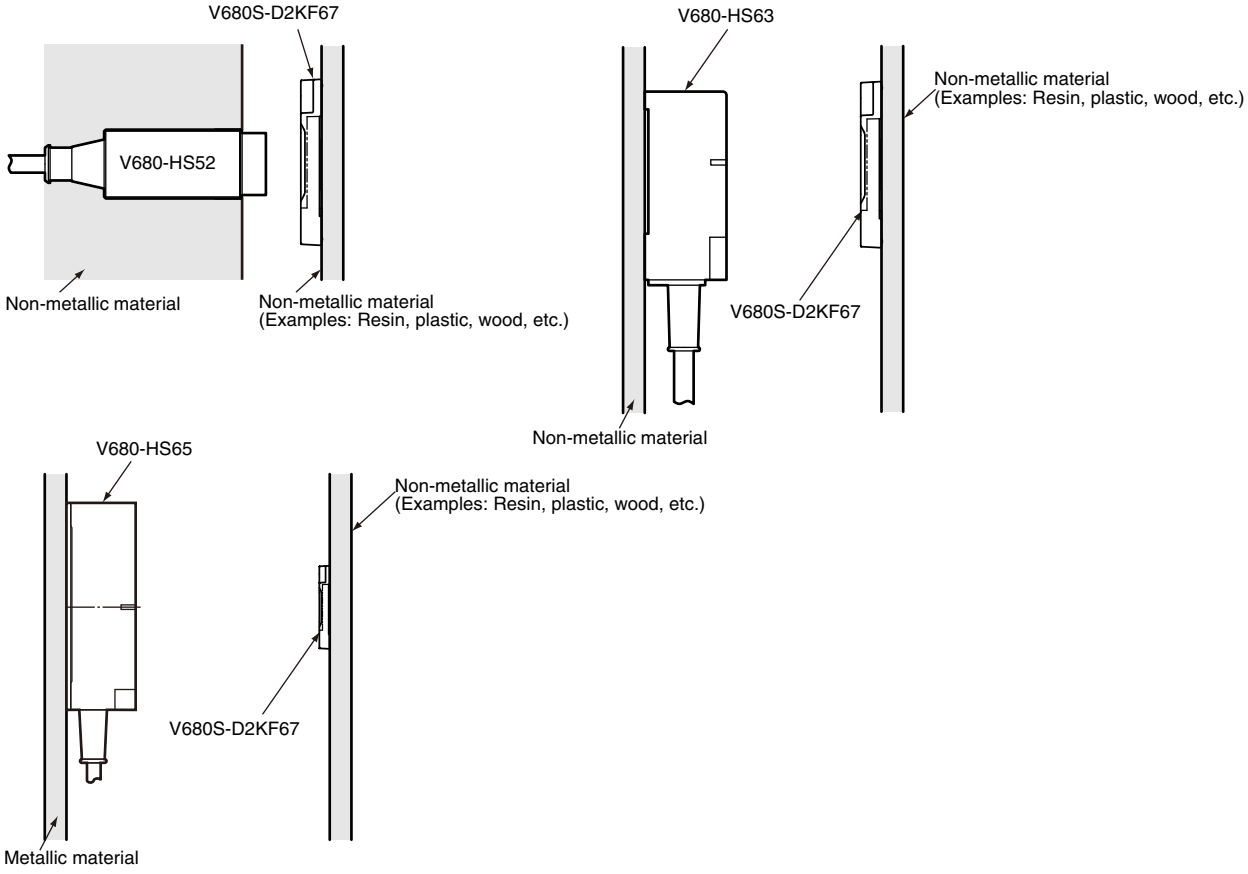




■ V680S-D2KF67

Antenna	RF Tag	Communications range	
V680-HS52	V680S-D2KF67	Read	1.0 to 17.0 mm (Axis offset: ±2)
		Write	1.0 to 17.0 mm (Axis offset: ±2)
V680-HS63	V680S-D2KF67	Read	7.0 to 30.0 mm (Axis offset: ±10)
		Write	7.0 to 30.0 mm (Axis offset: ±10)
V680-HS65	V680S-D2KF67	Read	5.0 to 42.0 mm (Axis offset: ±10)
		Write	5.0 to 42.0 mm (Axis offset: ±10)

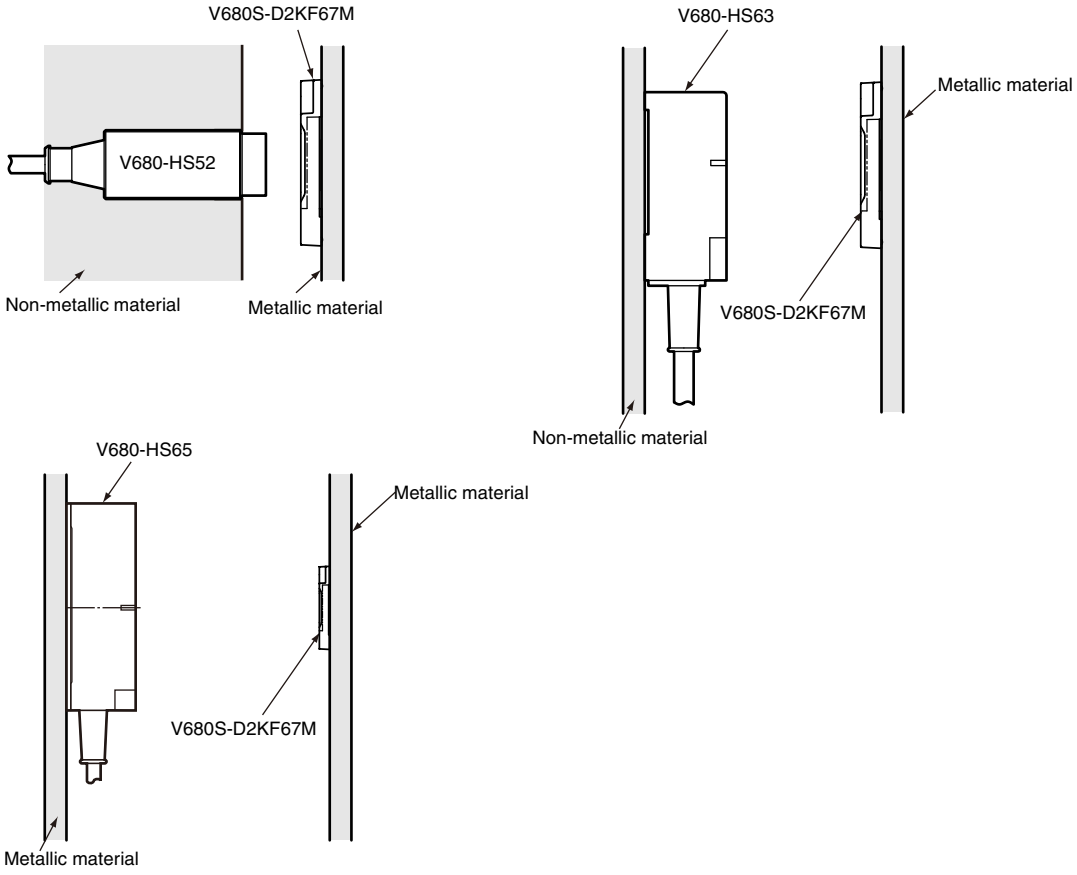
▪ Measurement Conditions



■ V680-D2KF67M

Antenna	RF Tag	Communications range	
V680-HS52	V680S-D2KF67M with metal on back (steel)	Read	1.0 to 16.0 mm (Axis offset: ±2)
		Write	1.0 to 16.0 mm (Axis offset: ±2)
V680-HS63	V680S-D2KF67M with metal on back (steel)	Read	6.0 to 25.0 mm (Axis offset: ±10)
		Write	6.0 to 25.0 mm (Axis offset: ±10)
V680-HS65	V680S-D2KF67M with metal on back (steel)	Read	5.0 to 25.0 mm (Axis offset: ±10)
		Write	5.0 to 25.0 mm (Axis offset: ±10)

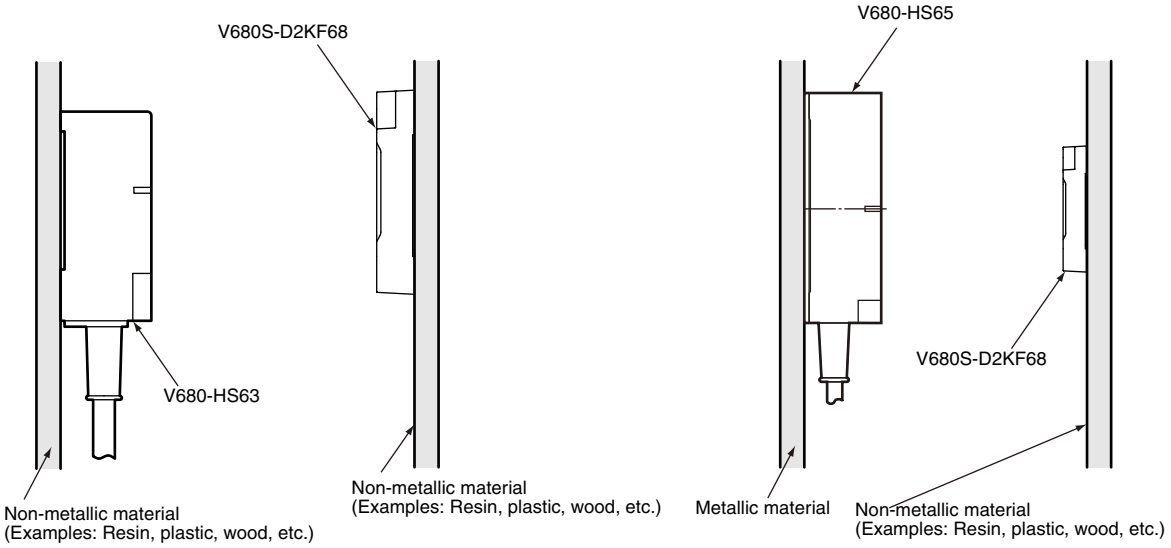
▪ Measurement Conditions



■ V680S-D2KF68

Antenna	RF Tag	Communications range	
V680-HS63	V680S-D2KF68	Read	5.0 to 45.0 mm (Axis offset: ±10)
		Write	5.0 to 45.0 mm (Axis offset: ±10)
V680-HS65	V680S-D2KF68	Read	5.0 to 75.0 mm (Axis offset: ±10)
		Write	5.0 to 75.0 mm (Axis offset: ±10)

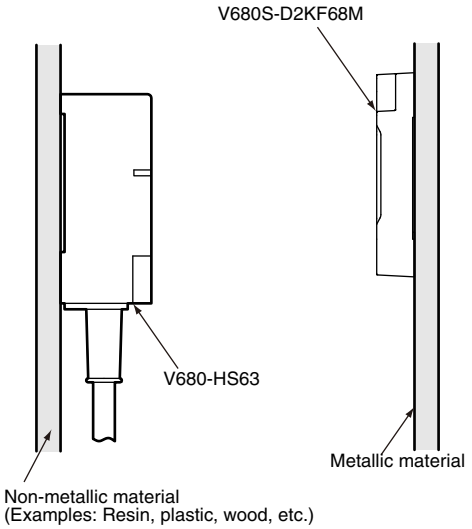
▪ Measurement Conditions

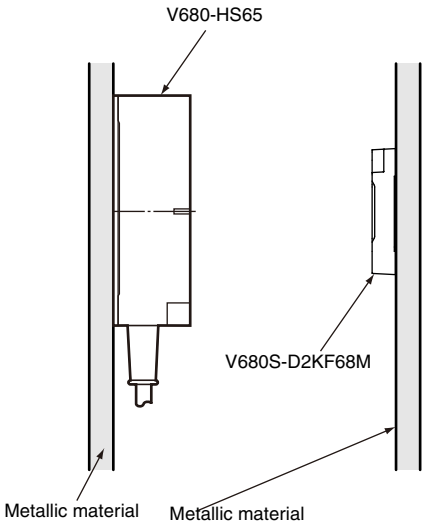


■ V680-D2KF68M

Antenna	RF Tag	Communications range	
V680-HS63	V680S-D2KF68M	Read	5.0 to 35.0 mm (Axis offset: ±10)
		Write	5.0 to 35.0 mm (Axis offset: ±10)
V680-HS65	V680S-D2KF68M	Read	5.0 to 55.0 mm (Axis offset: ±10)
		Write	5.0 to 55.0 mm (Axis offset: ±10)

▪ Measurement Conditions

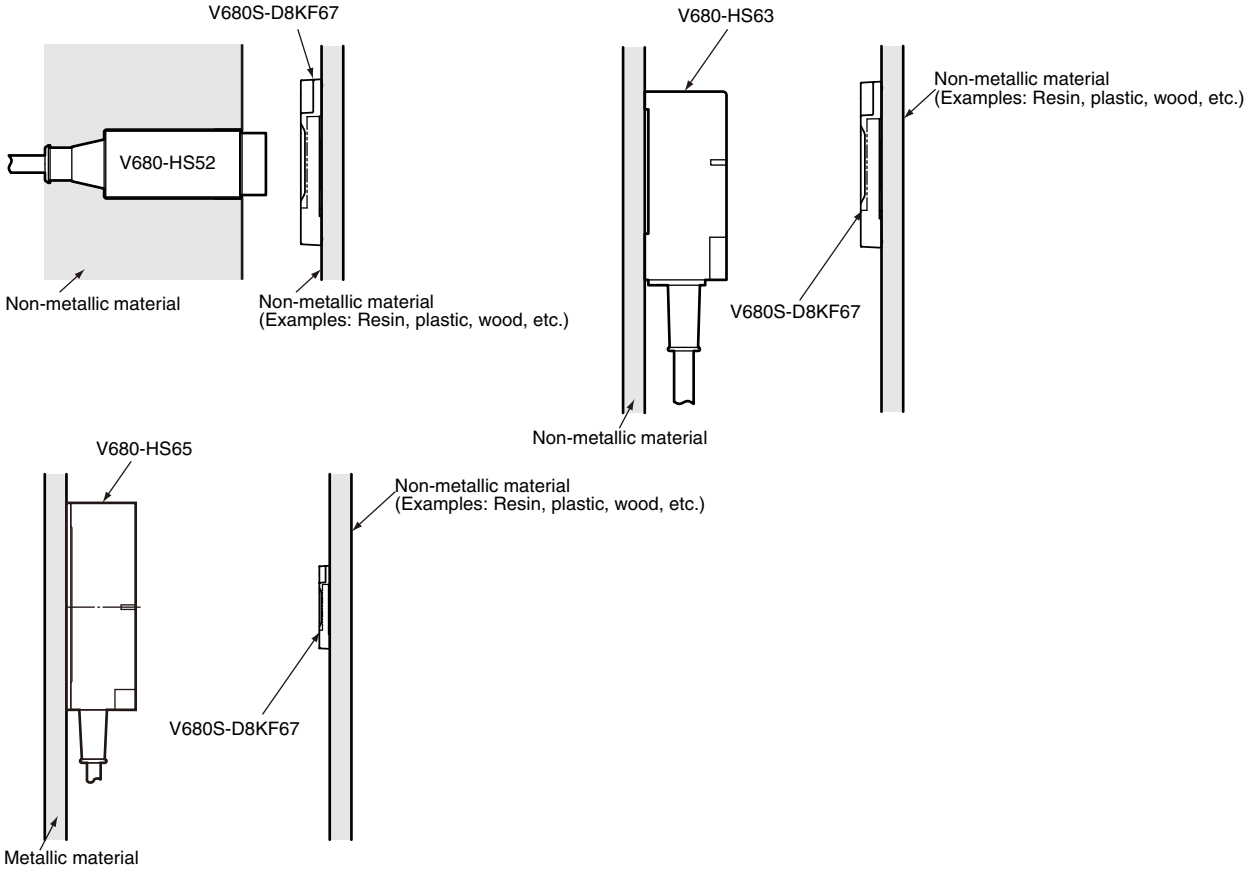




■ V680S-D8KF67

Antenna	RF Tag	Communications range	
V680-HS52	V680S-D8KF67	Read	1.0 to 17.0 mm (Axis offset: ±2)
		Write	1.0 to 17.0 mm (Axis offset: ±2)
V680-HS63	V680S-D8KF67	Read	7.0 to 30.0 mm (Axis offset: ±10)
		Write	7.0 to 30.0 mm (Axis offset: ±10)
V680-HS65	V680S-D8KF67	Read	5.0 to 42.0 mm (Axis offset: ±10)
		Write	5.0 to 42.0 mm (Axis offset: ±10)

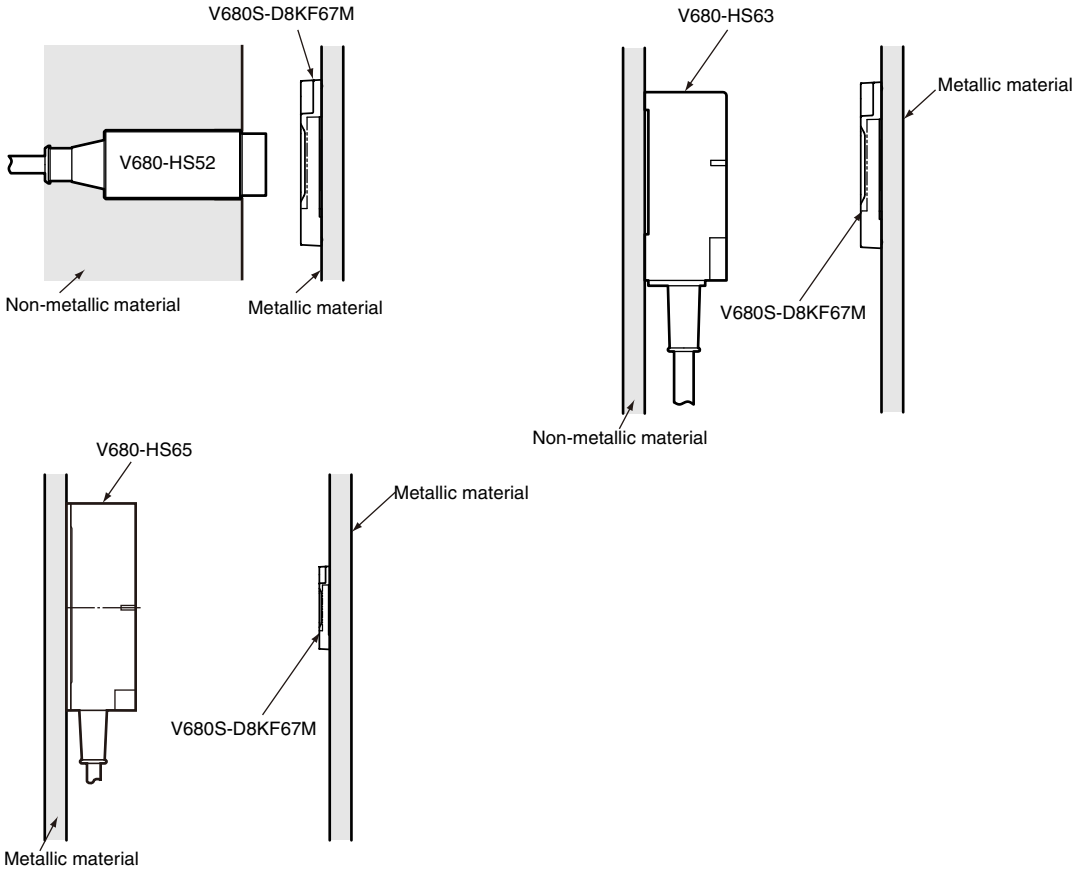
▪ Measurement Conditions



■ V680-D8KF67M

Antenna	RF Tag	Communications range	
V680-HS52	V680S-D8KF67M with metal on back (steel)	Read	1.0 to 16.0 mm (Axis offset: ±2)
		Write	1.0 to 16.0 mm (Axis offset: ±2)
V680-HS63	V680S-D8KF67M with metal on back (steel)	Read	6.0 to 25.0 mm (Axis offset: ±10)
		Write	6.0 to 25.0 mm (Axis offset: ±10)
V680-HS65	V680S-D8KF67M with metal on back (steel)	Read	5.0 to 25.0 mm (Axis offset: ±10)
		Write	5.0 to 25.0 mm (Axis offset: ±10)

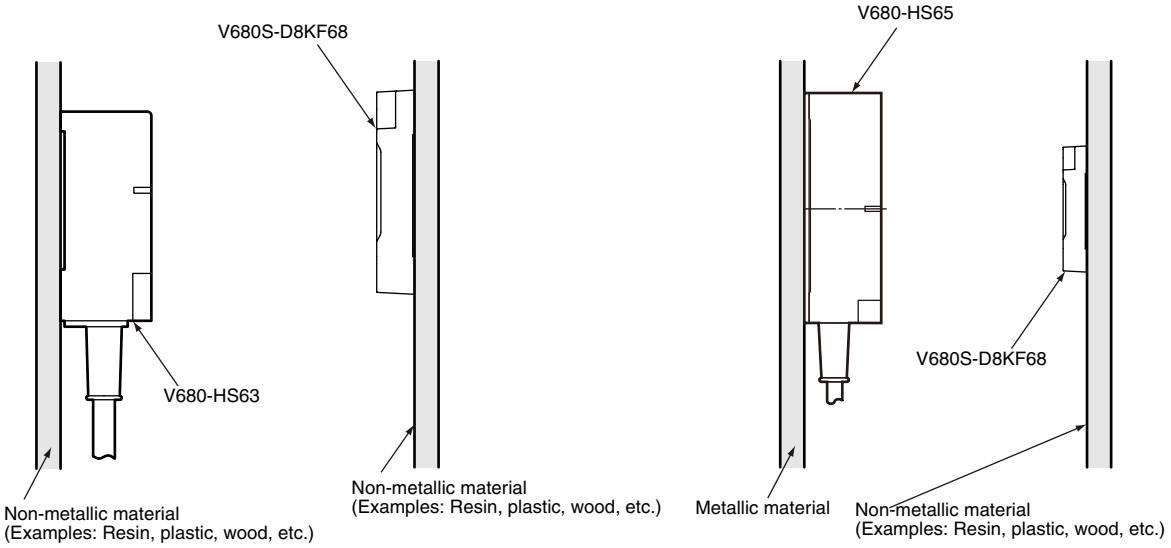
▪ Measurement Conditions



■ V680S-D8KF68

Antenna	RF Tag	Communications range	
V680-HS63	V680S-D8KF68	Read	5.0 to 45.0 mm (Axis offset: ±10)
		Write	5.0 to 45.0 mm (Axis offset: ±10)
V680-HS65	V680S-D8KF68	Read	5.0 to 75.0 mm (Axis offset: ±10)
		Write	5.0 to 75.0 mm (Axis offset: ±10)

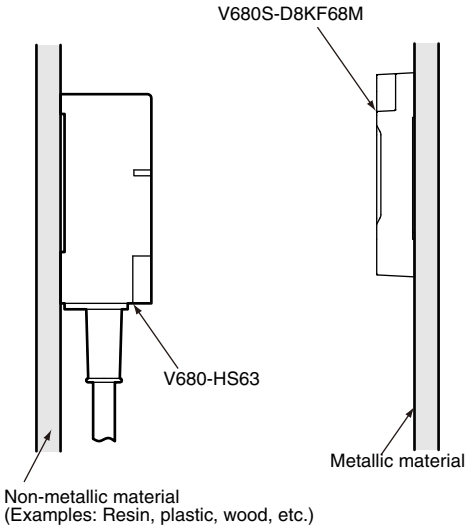
▪ Measurement Conditions

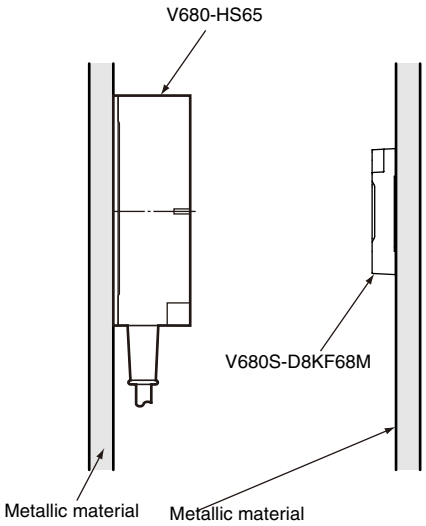


■ V680-D8KF68M

Antenna	RF Tag	Communications range	
V680-HS63	V680S-D8KF68M	Read	5.0 to 35.0 mm (Axis offset: ±10)
		Write	5.0 to 35.0 mm (Axis offset: ±10)
V680-HS65	V680S-D8KF68M	Read	5.0 to 55.0 mm (Axis offset: ±10)
		Write	5.0 to 55.0 mm (Axis offset: ±10)

▪ Measurement Conditions





Characteristics According to Operating Conditions

Interrogation Zone (Reference)

The following diagram shows the interrogation zone for the V680 Series. The interrogation zone depends on the installation conditions and environmental conditions.

The following diagram shows the interrogation zone when a RF Tag passes by and perpendicular to the center of the Antenna. The Antenna and RF Tag surfaces are parallel to each other.

■ V680-D1KP52MT

CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

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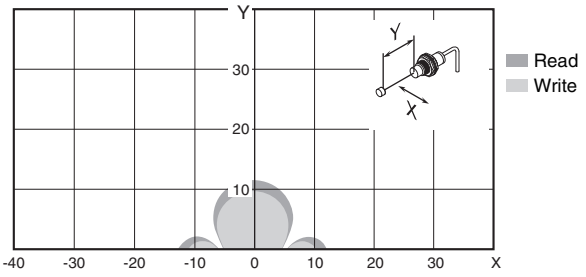
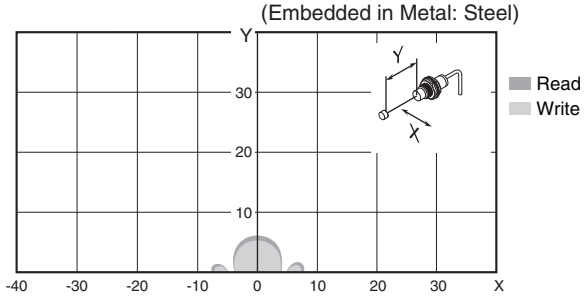
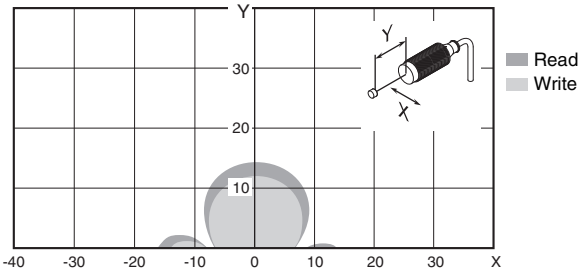
● V680-HS51（Embedded in Metal）and V680-D1KP52MT



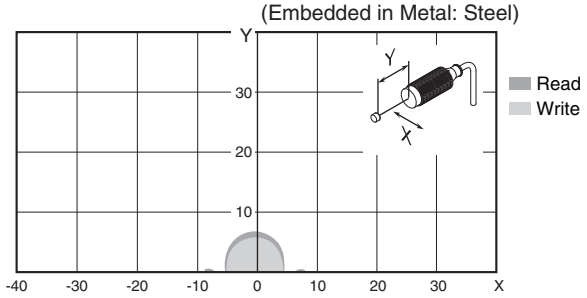
● V680-HS51（Embedded in Metal）and V680-D1KP52MT
(Embedded in Metal: Steel)



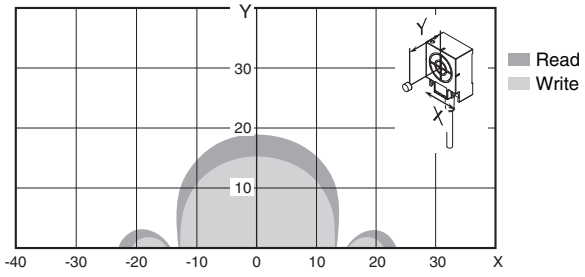
● V680-HS52（Embedded in Non-Metal）and V680-D1KP52MT



● V680-HS52（Embedded in Non-Metal）and V680-D1KP52MT
(Embedded in Metal: Steel)



● V680-HS63（with Non-Metal on Back Surface）and V680-D1KP52MT



■ V680-D1KP53M

CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

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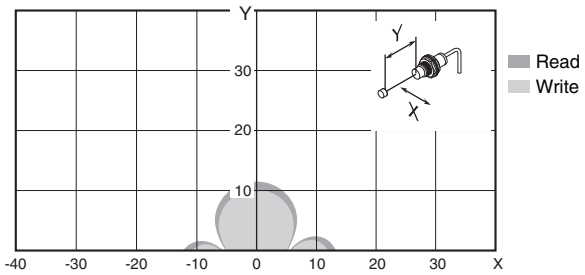
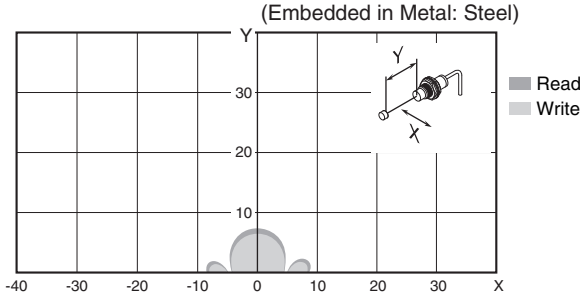
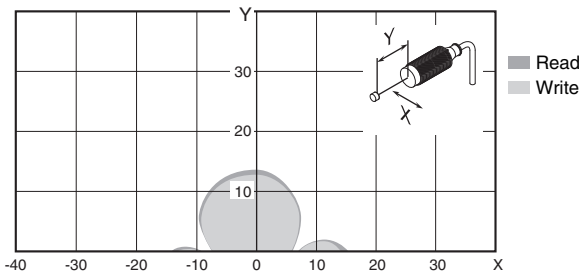
● V680-HS51（Embedded in Metal）and V680-D1KP53M



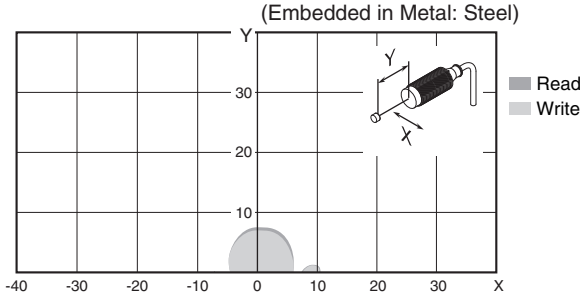
● V680-HS51（Embedded in Metal）and V680-D1KP53M
(Embedded in Metal: Steel)



● V680-HS52（Embedded in Non-Metal）and V680-D1KP53M



● V680-HS52（Embedded in Non-Metal）and V680-D1KP53M
(Embedded in Metal: Steel)



■ V680-D1KP66T

CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

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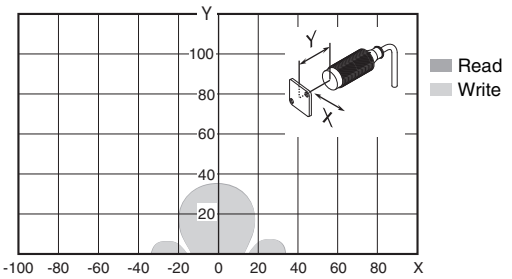
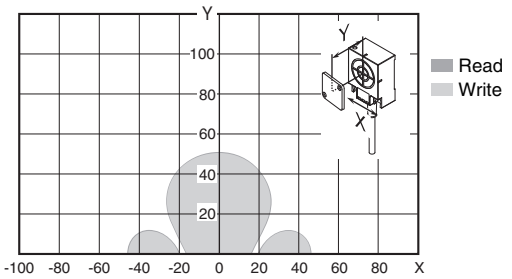
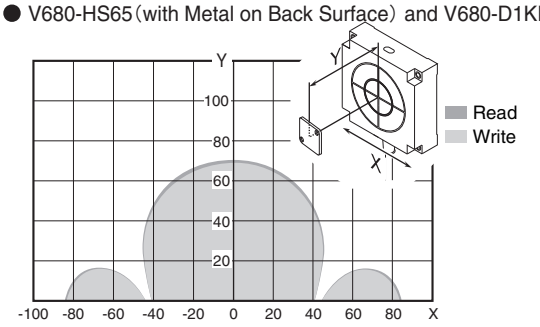
● V680-HS52（Embedded in Non-Metal） and V680-D1KP66T



● V680-HS63（with Non-Metal on Back Surface） and V680-D1KP66T



● V680-HS65（with Metal on Back Surface） and V680-D1KP66T



■ V680-D1KP66MT

CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

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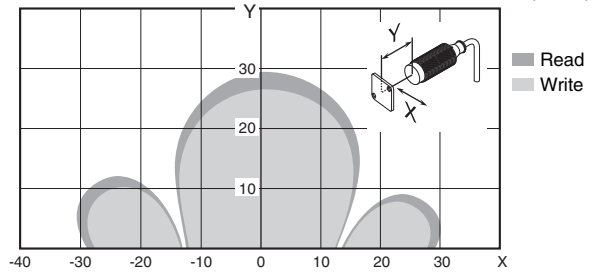
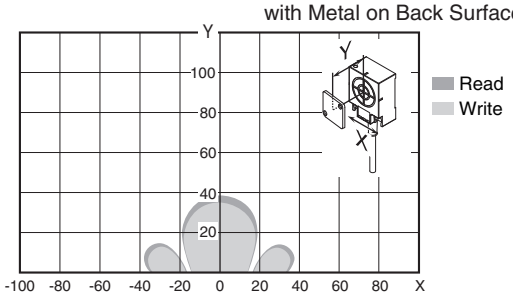
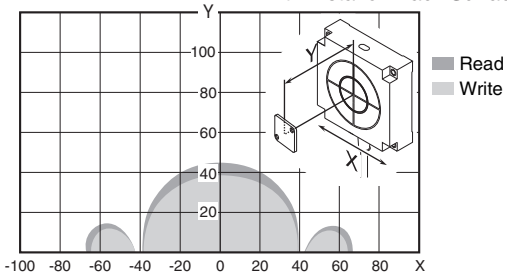
● V680-HS52（Embedded in Non-Metal） and V680-D1KP66MT with Metal on Back Surface (Steel)



● V680-HS63（with Non-Metal on Back Surface） and V680-D1KP66MT with Metal on Back Surface (Steel)



● V680-HS65（with Metal on Back Surface） and V680-D1KP66MT with Metal on Back Surface (Steel)



■ V680-D1KP66T-SP

CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

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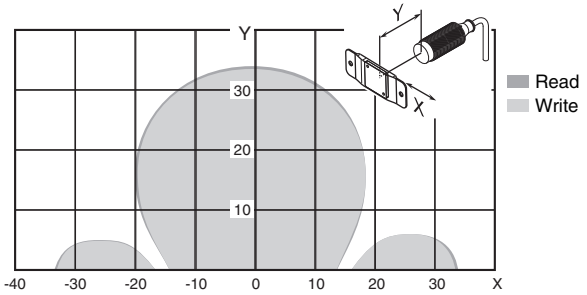
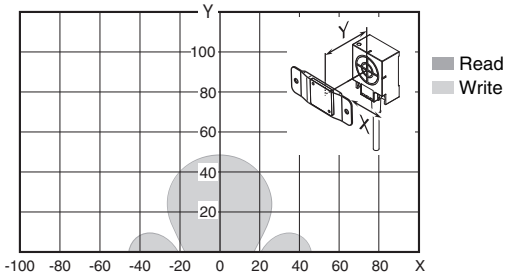
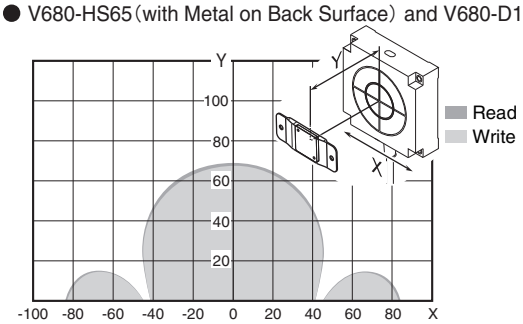
● V680-HS52 (Embedded in Non-Metal) and V680-D1KP66T-SP



● V680-HS63 (with Non-Metal on Back Surface) and V680-D1KP66T-S



● V680-HS65 (with Metal on Back Surface) and V680-D1KP66T-SP



■ V680-D2KF52M

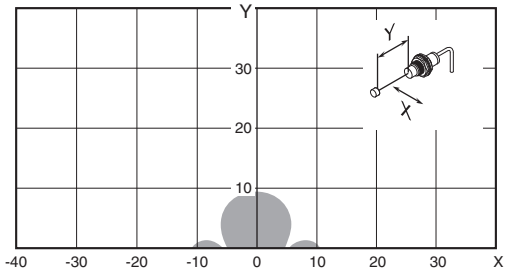
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.108

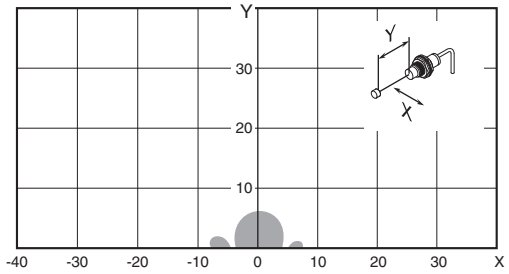
● V680-HS51 (Embedded in Metal) and V680-D2KF52M

- Read/Write



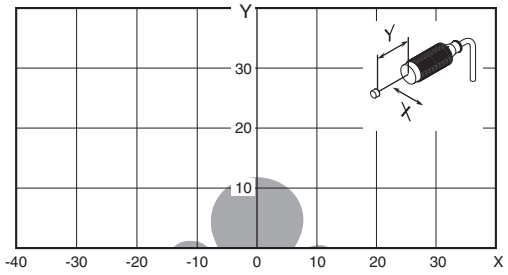
● V680-HS51 (Embedded in Metal) and V680-D2KF52M (Embedded in Metal: Steel)

- Read/Write



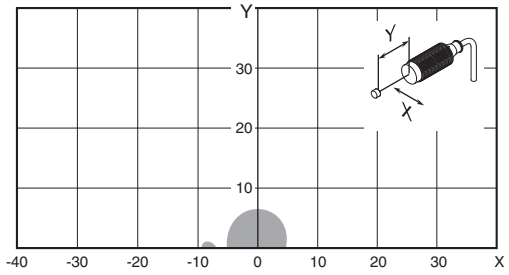
● V680-HS52 (Embedded in Non-Metal) and V680-D2KF52M

- Read/Write



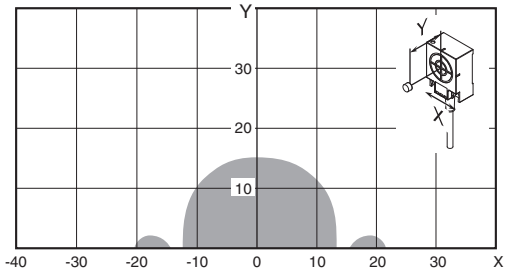
● V680-HS52 (Embedded in Non-Metal) and V680-D2KF52M (Embedded in Metal: Steel)

- Read/Write



● V680-HS63 (with Non-Metal on Back Surface) and V680-D2KF52M

- Read/Write



■ V680-D8KF67

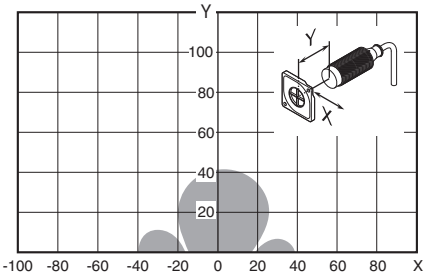
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.109

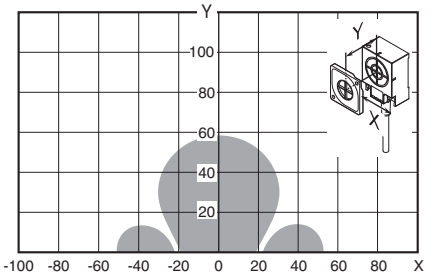
● V680-HS52（Embedded in Non-Metal） and V680-D8KF67

・Read/Write



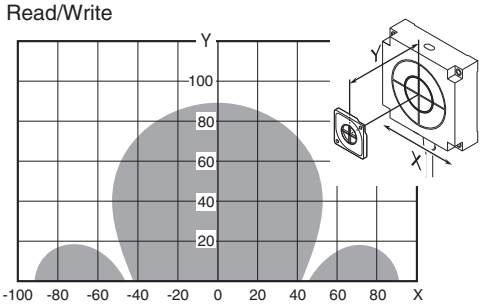
● V680-HS63（with Non-Metal on Back Surface） and V680-D8KF67

・Read/Write



● V680-HS65（with Metal on Back Surface） and V680-D8KF67

・Read/Write



■ V680-D8KF67M

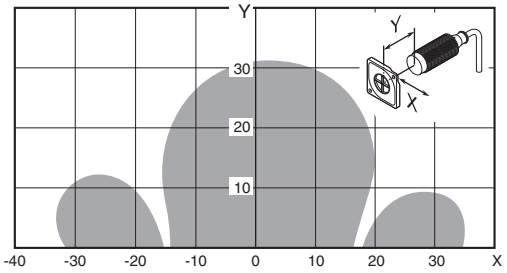
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.110

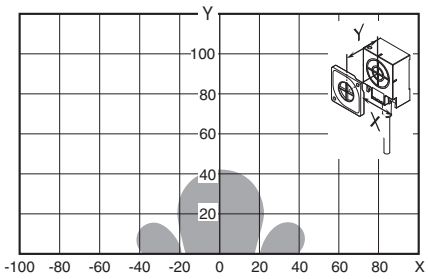
● V680-HS52（Embedded in Non-Metal） and V680-D8KF67M with Metal on Back Surface (Steel)

・Read/Write



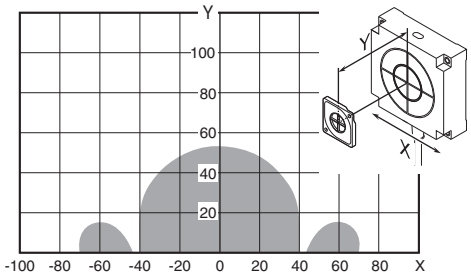
● V680-HS63（with Non-Metal on Back Surface） and V680-D8KF67M with Metal on Back Surface (Steel)

・Read/Write



● V680-HS65（with Metal on Back Surface） and V680-D8KF67M with Metal on Back Surface (Steel)

・Read/Write



■ V680-D8KF68/-D32KF68

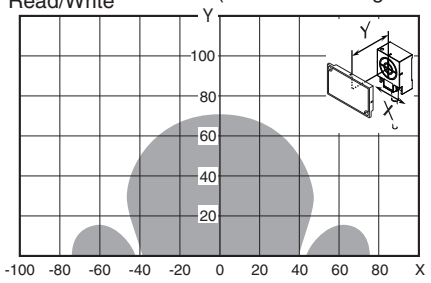
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.111

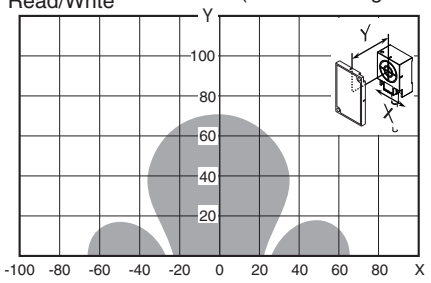
● V680-HS63 (with Metal on Back Surface) and V680-D8KF68/-D32KF68 (Horizontal-facing RF Tag)

・Read/Write



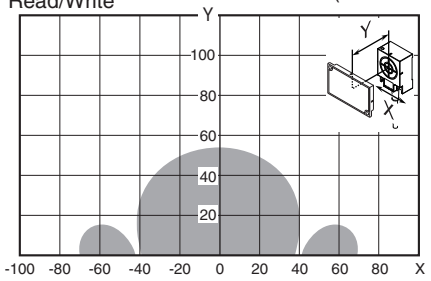
● V680-HS63 (with Metal on Back Surface) and V680-D8KF68/-D32KF68 (Vertical-facing RF Tag)

・Read/Write



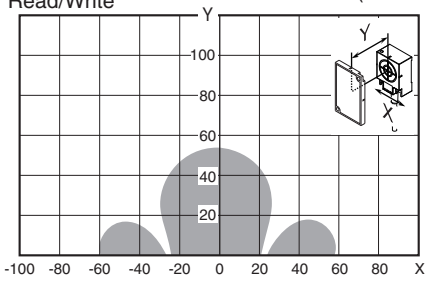
● V680-HS63 (with Metal on Back Surface) and V680-D8KF68/-D32KF68 (with Attachment, V680-A81) Metal on back: Steel (Horizontal-facing RF Tag)

・Read/Write



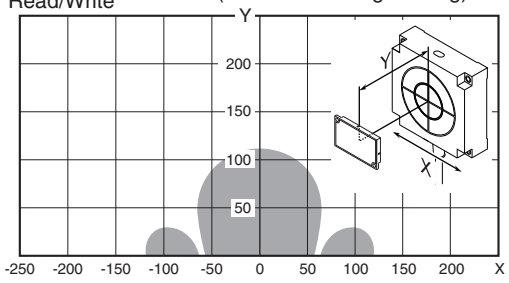
● V680-HS63 (with Metal on Back Surface) and V680-D8KF68/-D32KF68 (with Attachment, V680-A81) Metal on back: Steel (Vertical-facing RF Tag)

・Read/Write



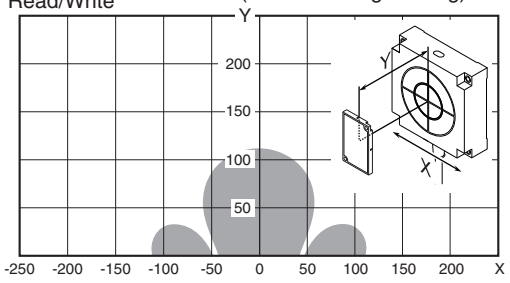
● V680-HS65 (with Metal on Back Surface) and V680-D8KF68/-D32KF68 (Horizontal-facing RF Tag)

・Read/Write



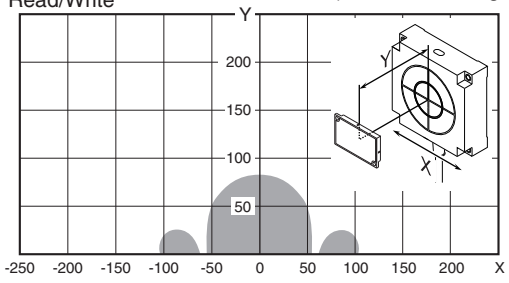
● V680-HS65 (with Metal on Back Surface) and V680-D8KF68/-D32KF68 (Vertical-facing RF Tag)

・Read/Write



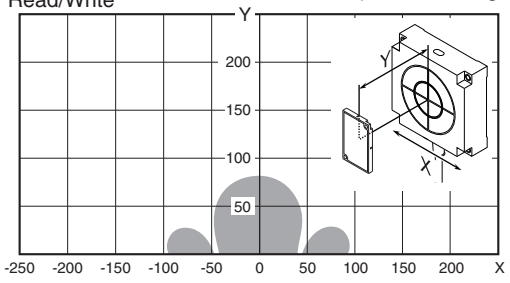
● V680-HS65 (with Metal on Back Surface) and V680-D8KF68/-D32KF68 (with Attachment, V680-A81) Metal on back: Steel (Horizontal-facing RF Tag)

・Read/Write



● V680-HS65 (with Metal on Back Surface) and V680-D8KF68/-D32KF68 (with Attachment, V680-A81) Metal on back: Steel (Vertical-facing RF Tag)

・Read/Write



■ V680S-D2KF67

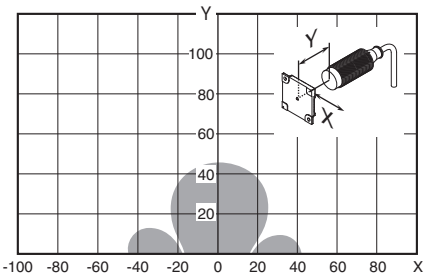
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.112

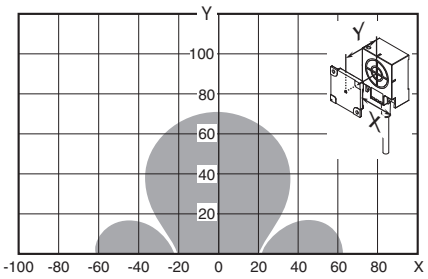
● V680-HS52（Embedded in Non-Metal） and V680S-D2KF67

・Read/Write



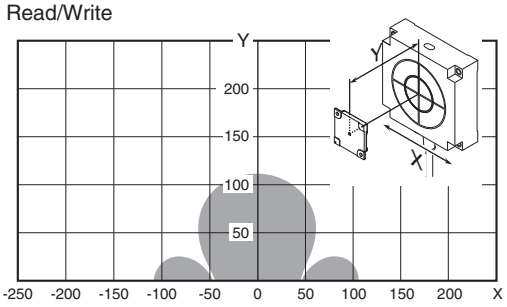
● V680-HS63（with Non-Metal on Back Surface） and V680S-D2KF67

・Read/Write



● V680-HS65（with Metal on Back Surface） and V680S-D2KF67

・Read/Write



■ V680S-D2KF67M

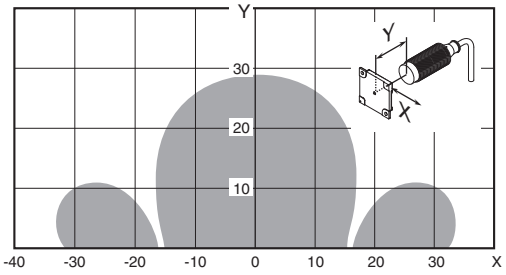
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.113

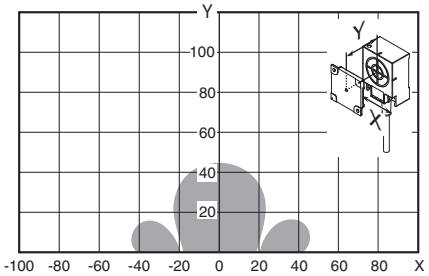
● V680-HS52（Embedded in Non-Metal） and V680S-D2KF67M with Metal on Back Surface (Steel)

・Read/Write



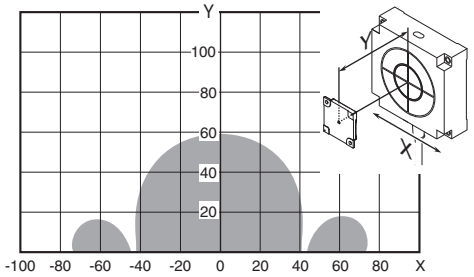
● V680-HS63（with Non-Metal on Back Surface） and V680S-D2KF67M with Metal on Back Surface (Steel)

・Read/Write



● V680-HS65（with Metal on Back Surface） and V680S-D2KF67M with Metal on Back Surface (Steel)

・Read/Write



■ V680S-D2KF68

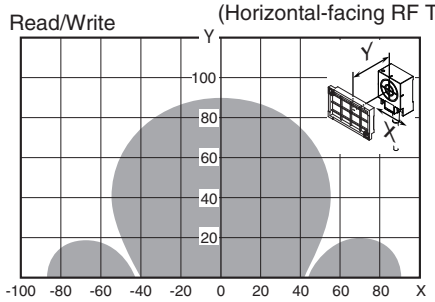
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.114

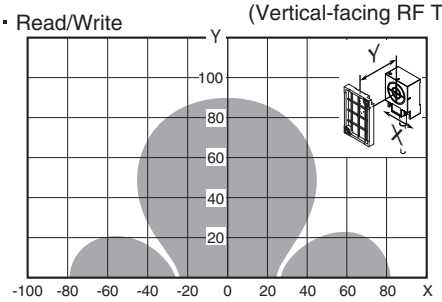
● V680-HS63 (with Metal on Back Surface) and V680S-D2KF68 (Horizontal-facing RF Tag)

・Read/Write



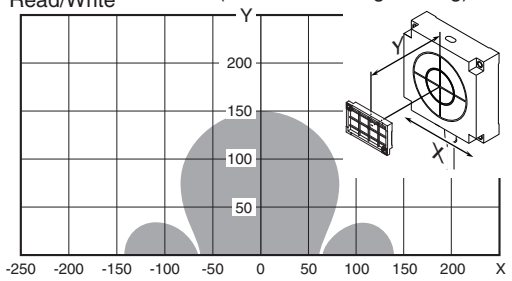
● V680-HS63 (with Metal on Back Surface) and V680S-D2KF68 (Vertical-facing RF Tag)

・Read/Write



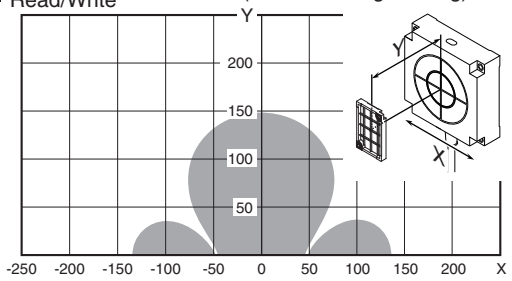
● V680-HS65 (with Metal on Back Surface) and V680S-D2KF68 (Horizontal-facing RF Tag)

・Read/Write



● V680-HS65 (with Metal on Back Surface) and V680S-D2KF68 (Vertical-facing RF Tag)

・Read/Write



■ V680S-D2KF68M

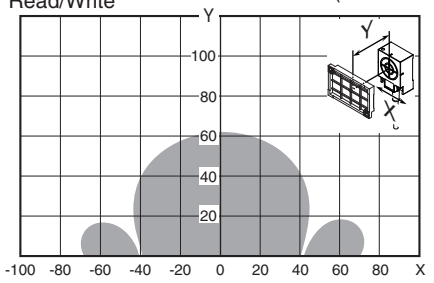
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.115

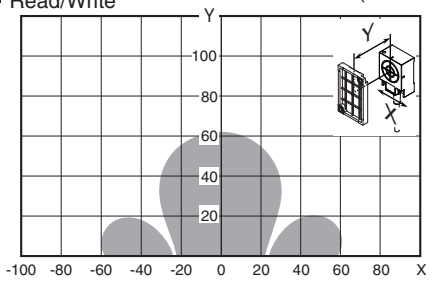
● V680-HS63 (with Metal on Back Surface)
and V680S-D2KF68M
Metal on back: Steel (Horizontal-facing RF Tag)

・Read/Write



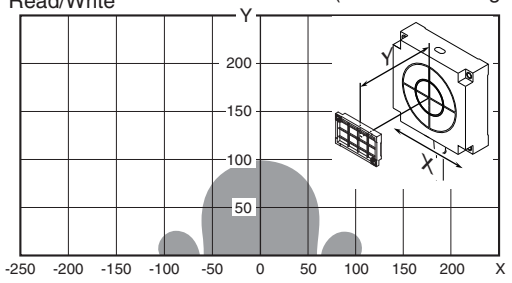
● V680-HS63 (with Metal on Back Surface)
and V680S-D2KF68M
Metal on back: Steel (Vertical-facing RF Tag)

・Read/Write



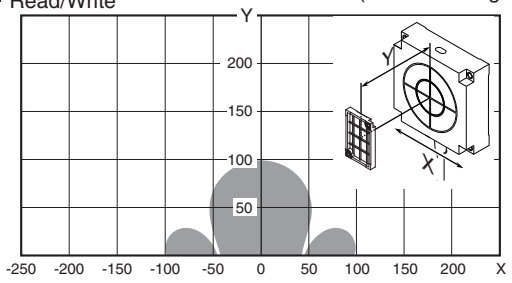
● V680-HS65 (with Metal on Back Surface)
and V680S-D2KF68M
Metal on back: Steel (Horizontal-facing RF Tag)

・Read/Write



● V680-HS65 (with Metal on Back Surface)
and V680S-D2KF68M
Metal on back: Steel (Vertical-facing RF Tag)

・Read/Write



■ V680S-D8KF67

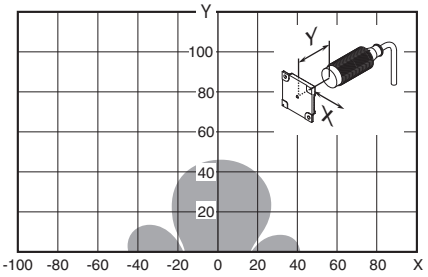
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.116

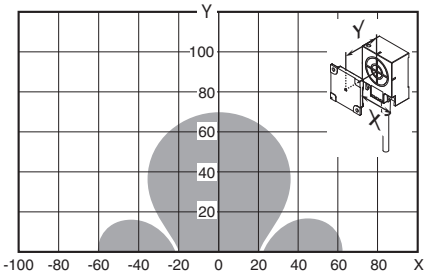
● V680-HS52（Embedded in Non-Metal） and V680S-D8KF67

・Read/Write



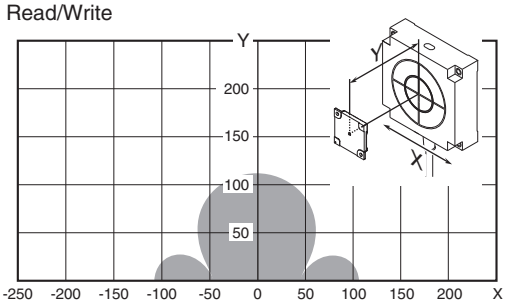
● V680-HS63（with Non-Metal on Back Surface） and V680S-D8KF67

・Read/Write



● V680-HS65（with Metal on Back Surface） and V680S-D8KF67

・Read/Write



■ V680S-D8KF67M

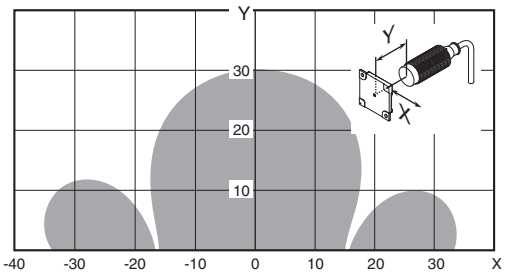
CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

p.117

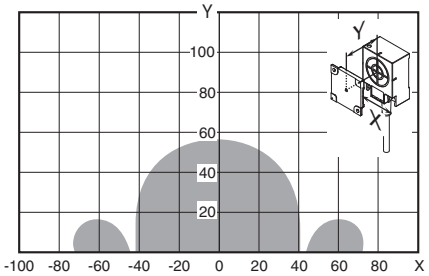
● V680-HS52（Embedded in Non-Metal） and V680S-D8KF67M with Metal on Back Surface (Steel)

・Read/Write



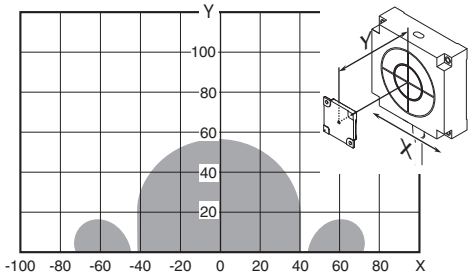
● V680-HS63（with Non-Metal on Back Surface） and V680S-D8KF67M with Metal on Back Surface (Steel)

・Read/Write



● V680-HS65（with Metal on Back Surface） and V680S-D8KF67M with Metal on Back Surface (Steel)

・Read/Write



■ V680S-D8KF68

CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

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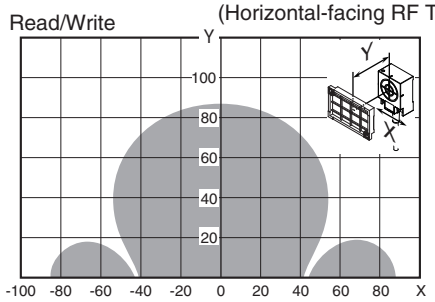
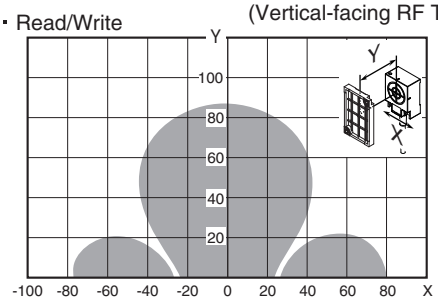
● V680-HS63 (with Metal on Back Surface) and V680S-D8KF68 (Horizontal-facing RF Tag)

・Read/Write



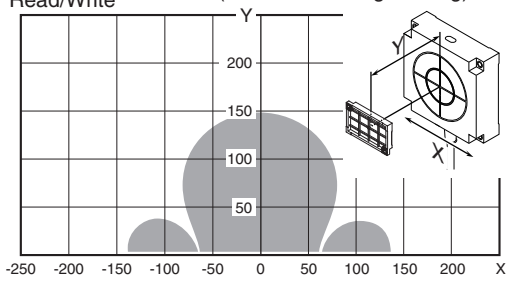
● V680-HS63 (with Metal on Back Surface) and V680S-D8KF68 (Vertical-facing RF Tag)

・Read/Write



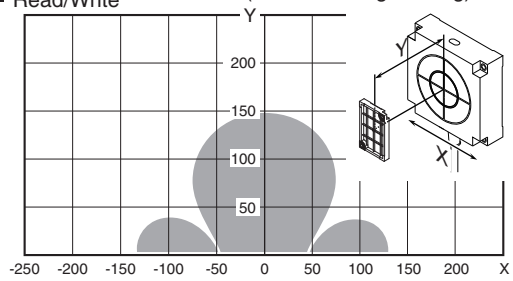
● V680-HS65 (with Metal on Back Surface) and V680S-D8KF68 (Horizontal-facing RF Tag)

・Read/Write



● V680-HS65 (with Metal on Back Surface) and V680S-D8KF68 (Vertical-facing RF Tag)

・Read/Write



■ V680S-D8KF68M

CHECK!

The interrogation zone given here are for reference only. For information on communications ranges, refer to *Communications Range Specifications* in this section. The interrogation zone depends on the type of RF Tags used, the ambient temperature, surrounding metals, and noise. Be sure to check carefully when installing the system.

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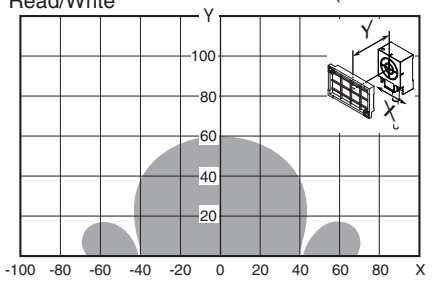
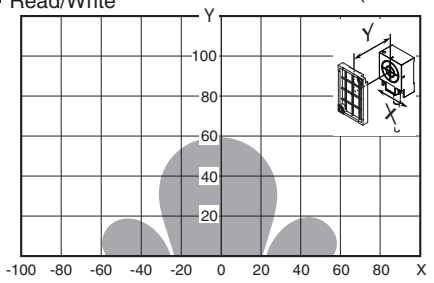
● V680-HS63 (with Metal on Back Surface)
and V680S-D8KF68M
Metal on back: Steel (Horizontal-facing RF Tag)

・Read/Write



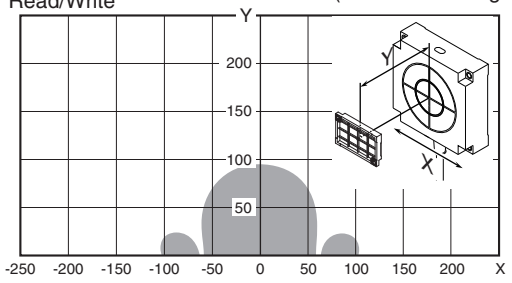
● V680-HS63 (with Metal on Back Surface)
and V680S-D8KF68M
Metal on back: Steel (Vertical-facing RF Tag)

・Read/Write



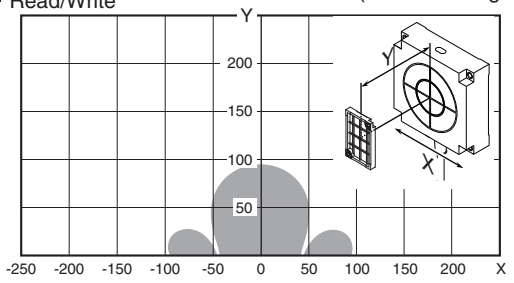
● V680-HS65 (with Metal on Back Surface)
and V680S-D8KF68M
Metal on back: Steel (Horizontal-facing RF Tag)

・Read/Write



● V680-HS65 (with Metal on Back Surface)
and V680S-D8KF68M
Metal on back: Steel (Vertical-facing RF Tag)

・Read/Write



Communications Time (Reference)

			Communications time (ms)		
			V680-D1KP□□	V680-D2KF□□	V680-D8KF□□/-D32KF□□
READ			29.6	27.5	29.0
WRITE, BIT SET, BIT CLEAR		With write verification	76.5	78.4	66.8
		Without write verification	71.4	58.3	62.5
DATA FILL	Normal mode	With write verification	17.6 × No. of processing blocks + 60	20.4 × No. of processing blocks + 52	13.3 × No. of processing blocks + 59
		Without write verification	14.9 × No. of processing blocks + 57	10.2 × No. of processing blocks + 49	10.9 × No. of processing blocks + 52
	High-speed mode	With write verification	14.9 × No. of processing blocks + 51	14.7 × No. of processing blocks + 49	8.8 × No. of processing blocks + 41
		Without write verification	12.1 × No. of processing blocks + 47	7.5 × No. of processing blocks + 41	7.6 × No. of processing blocks + 40

CHECK!

Processing blocks refer to the 8-byte memory areas expressed by RF Tag addresses □□□0 to □□□7 hex and □□□8 to □□□F hex.

			Communications time (ms)
			V680S-D8KF□□
READ			42
WRITE, BIT SET, BIT CLEAR		With write verification	133
		Without write verification	97
DATA FILL	Normal mode	With write verification	9.1× No. of processing blocks + 105.5
		Without write verification	4.6 × No. of processing blocks + 82.9
	High-speed mode (See note.)	With write verification	9.1× No. of processing blocks + 105.5
		Without write verification	4.6 × No. of processing blocks + 82.9

Note: When using V680S-D8KF□□ RF Tags, the Normal Mode communications speed will be used even if the High-speed Mode is set.

CHECK!

Processing blocks refer to the 32-byte memory areas expressed by RF Tag addresses □□00 hex to □□1F hex, □□20 hex to □□3F hex, ···, □□E0 hex to □□FF hex.

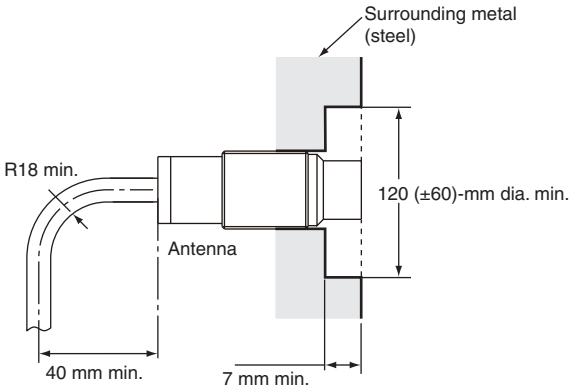
Reference Data

Antenna Mounting Precautions

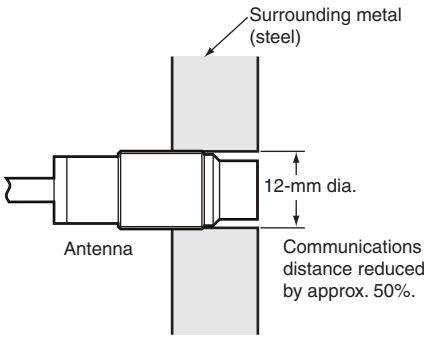
■ V680-HS51

▪ Effect of Surrounding Metals on the Antenna (Reference)

When embedding the Antenna in metal, be sure the metal does not extend beyond the tip of the Antenna.



Do not bend the cable into a curve tighter than 18 mm in radius.

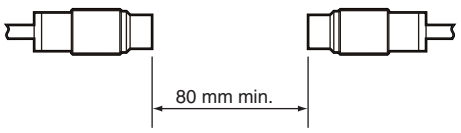


If the metal around the Antenna reaches the communication surface, the communications distance will be reduced by approx. 50% compared with mounting to a non-metallic surface.

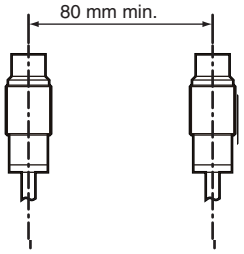
▪ Mutual Interference between Antennas (Reference)

To prevent malfunctioning due to mutual interference when using more than one Antenna, leave sufficient space between them as shown in the following diagrams.

² Installing the Antennas Facing Each Other



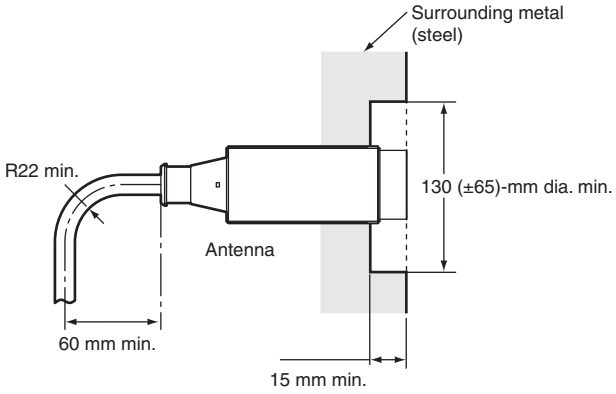
² Installing the Antennas in Parallel



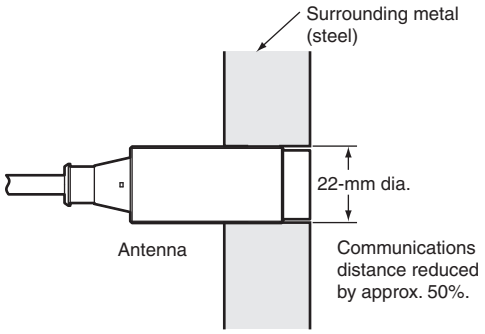
■ V680-HS52

▪ Effect of Surrounding Metals on the Antenna (Reference)

When embedding the Antenna in metal, be sure the metal does not extend beyond the tip of the Antenna.



Do not bend the cable into a curve tighter than 22 mm in radius.

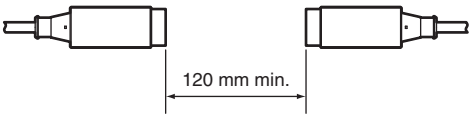


If the metal around the Antenna reaches the coil surface, the communications distance will be reduced by approx. 50% compared with mounting to a non-metallic surface.

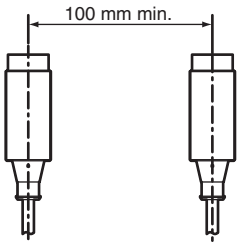
▪ Mutual Interference between Antennas (Reference)

To prevent malfunctioning due to mutual interference when using more than one Antenna, leave sufficient space between them as shown in the following diagrams.

² Installing the Antennas Facing Each Other



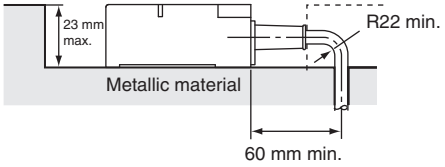
² Installing the Antennas in Parallel

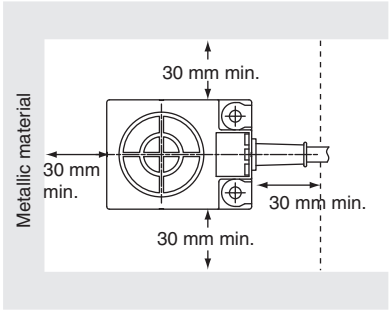


■ V680-HS63

▪ Effect of Surrounding Metals on the Antenna (Reference)

In addition to surface mounting, it is also possible to embed the V680-HS63 in a metallic material to protect it from being struck by other objects. To prevent malfunctioning, allow a space of at least 30 mm between the Antenna and the sides of the metallic material. If the space is less than 30 mm, the read/write distance will be greatly diminished. In addition, the height of metallic material must not exceed that of the Antenna.



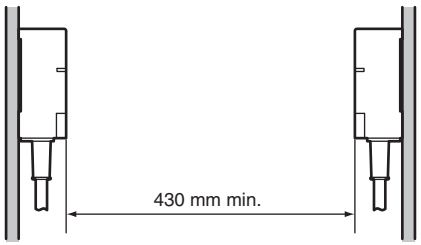


Note 1: Do not bend the cable into a curve tighter than 22 mm in radius.
2: The communications range will be reduced significantly if the Antenna is installed closer than 30 mm to metal surfaces.

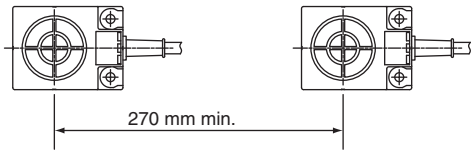
▪ Mutual Interference between Antennas (Reference)

To prevent malfunctioning due to mutual interference when using more than one Antenna, leave sufficient space between them as shown in the following diagrams.

² Installing the Antennas Facing Each Other



² Installing the Antennas in Parallel

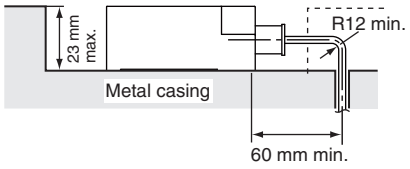


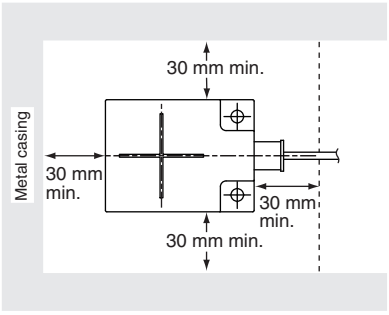
■ V680-HS63-SP

▪ Effect of Surrounding Metals on the Antenna (Reference)

Instead of mounting the Antenna on the surface, it can be embedded into the metal work to prevent collision with the workpiece and/or equipment.

If the Antenna is too close to metal, the communications capabilities may be significantly affected. Make sure that the following minimum distances are maintained when mounting the Antenna this way.





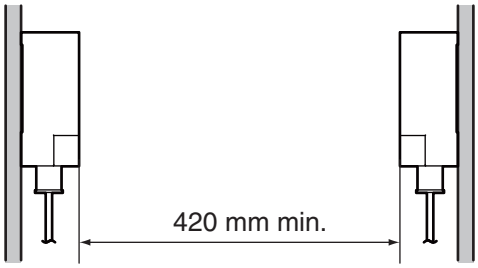
CHECK! Do not bend the cable into a curve tighter than 12 mm in radius.

CHECK! The communications range will be reduced significantly if the Antenna is installed closer than 30 mm to metal surfaces.

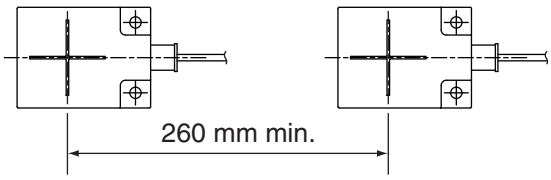
▪ Mutual Interference between Antennas (Reference)

To prevent malfunctioning due to mutual interference when using more than one Antenna, leave sufficient space between them as shown in the following diagrams.

Installing the Antennas Facing Each Other



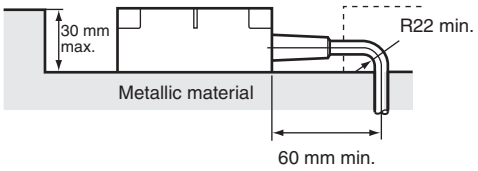
Installing the Antennas in Parallel

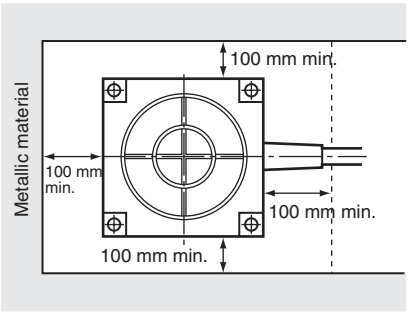


■ V680-HS65

▪ Effect of Surrounding Metals on the Antenna (Reference)

In addition to surface mounting, it is also possible to embed the V680-HS65 in a metallic material to protect it from being struck by other objects. To prevent malfunctioning, allow a space of at least 100 mm between the Antenna and the sides of the metallic material. If the space is less than 100 mm, the read/write distance will be greatly diminished. In addition, the height of metallic material must not exceed that of the Antenna.



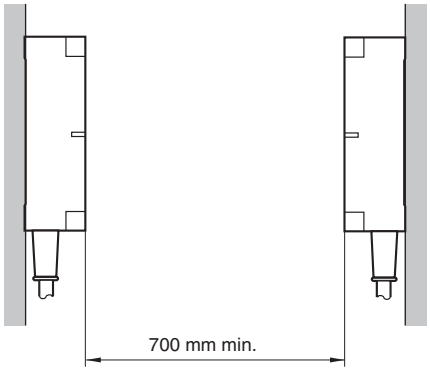


Note 1: Do not bend the cable into a curve tighter than 22 mm in radius.
2: The communications range will be reduced significantly if the Antenna is installed closer than 100 mm to metal surfaces.

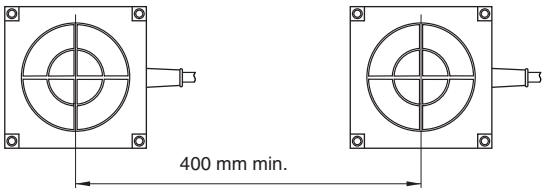
▪ Mutual Interference between Antennas (Reference)

To prevent malfunctioning due to mutual interference when using more than one Antenna, leave sufficient space between them as shown in the following diagrams.

² Installing the Antennas Facing Each Other



² Installing the Antennas in Parallel



RF Tag Mounting Precautions

■ V680-D1KP52MT

▪ Differences in Surrounding Metals(Reference)

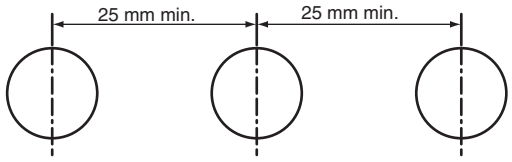
Communications ranges are affected by the type of metal in back of or surrounding the RF Tag, as shown in the following table.

	Steel	SUS	Brass	Aluminum
V680-D2KF52M	100%	85% to 90%	80% to 85%	80% to 85%

Note: The value for steel around or behind the RF Tag is set to 100%.

▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

Install Antennas and RF Tags as close to parallel to each other as possible.

Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

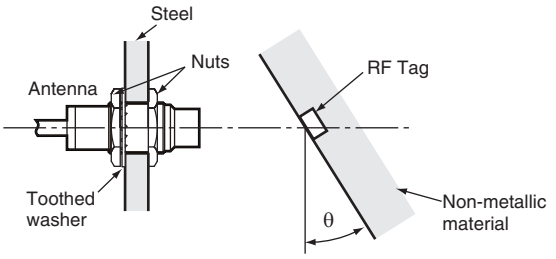
Percentage of Change in Communications Range for 680-D1KP52MT Angle

	RF Tag angle (θ°)				
	0	10	20	30	40
V680-HS51 and V680-D1KP52MT	0%	−1%	−5%	−10%	−15%
V680-HS51 and V680-D1KP52MT (Metal on back: Steel)	0%	0%	0%	−4%	−28%
V680-HS52 and V680-D1KP52MT	0%	0%	0%	−2%	−6%
V680-HS52 and V680-D1KP52MT (Metal on back: Steel)	0%	−6%	−13%	−25%	---
V680-HS63 and V680-D1KP52MT	0%	−2%	−5%	−9%	−14%

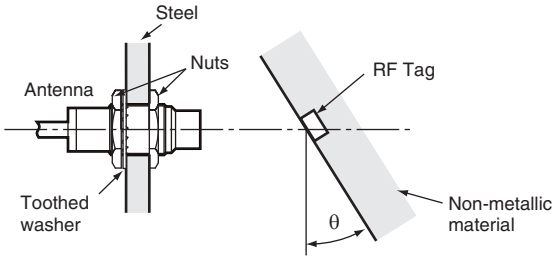
---: Measurement is not possible because Antenna and RF Tag would strike each other.

Measurement Conditions

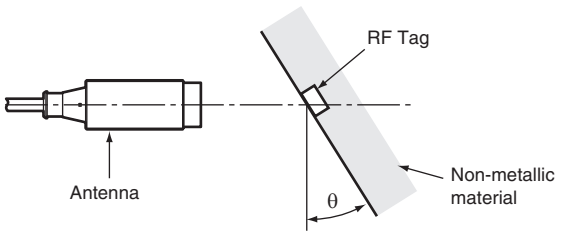
● V680-HS51 and V680-D1KP52MT



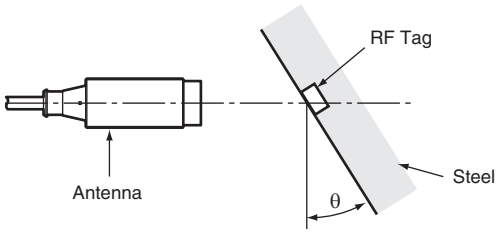
● V680-HS51 and V680-D1KP52MT (Metal on back: Steel)



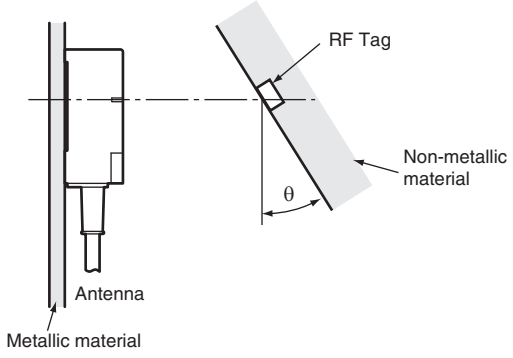
● V680-HS52 and V680-D1KP52MT



● V680-HS52 and V680-D1KP52MT (Metal on back: Steel)



● V680-HS63 and V680-D1KP52MT



■ V680-D1KP53M

▪ Differences in Surrounding Metals(Reference)

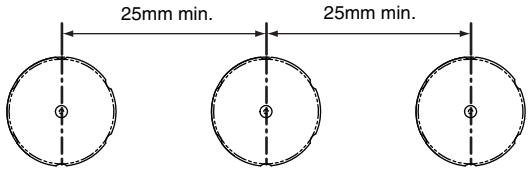
communications ranges are affected by the type of metal in back of or surrounding the RF Tag, as shown in the following table.

	Steel	SUS	Brass	Aluminum
V680-D1KP53M	100%	90% to 95%	90% to 95%	90% to 95%

Note: The value for steel around or behind the RF Tag is set to 100%.

▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

Install Antennas and RF Tags as close to parallel to each other as possible.

Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

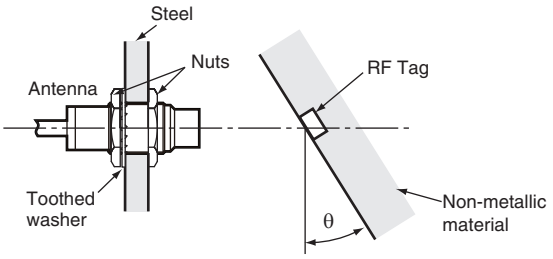
Percentage of Change in Communications Range for 680-D1KP53M Angle

	RF Tag angle (θ°)				
	0	10	20	30	40
V680-HS51 and V680-D1KP53M	0%	−1%	−5%	−10%	−15%
V680-HS51 and V680-D1KP53M (Metal on back: Steel)	0%	0%	0%	−4%	−28%
V680-HS52 and V680-D1KP53M	0%	0%	0%	−2%	−6%
V680-HS52 and V680-D1KP53M (Metal on back: Steel)	0%	−6%	−13%	−25%	---

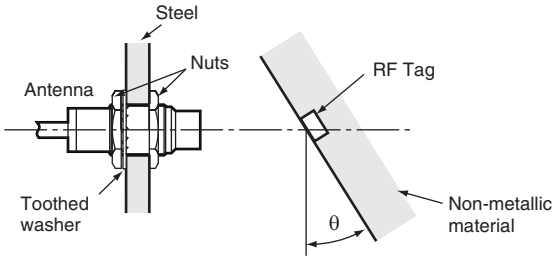
---: Measurement is not possible because Antenna and RF Tag would strike each other.

Measurement Conditions

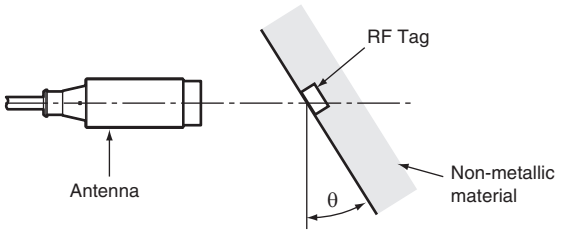
● V680-HS51 and V680-D1KP53M



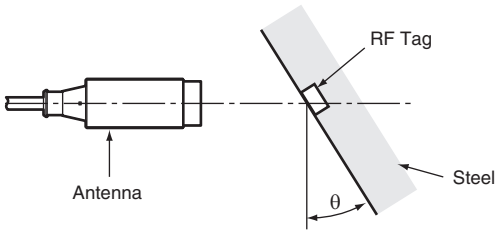
● V680-HS51 and V680-D1KP53M (Metal on back: Steel)



● V680-HS52 and V680-D1KP53M



● V680-HS52 and V680-D1KP53M (Metal on back: Steel)

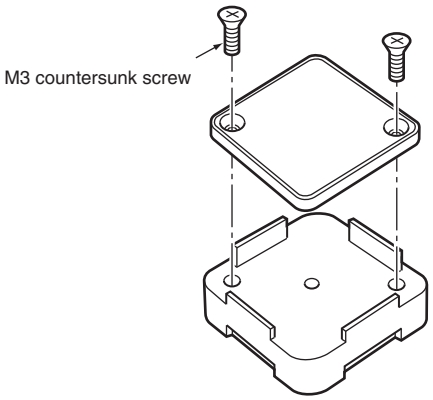


■ V680-D1KP66T

▪ Effect of Metal on Back of RF Tags (Reference)

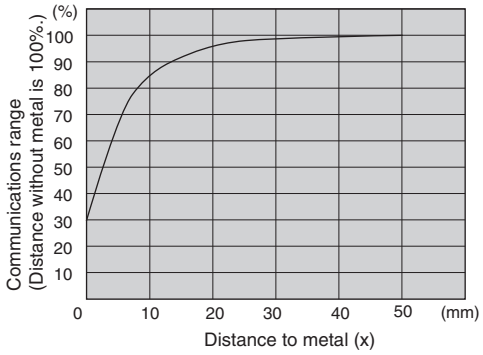
The V680-D1KP66T communications range is reduced if there is any metal on the back of the RF Tag. If the RF Tag is to be mounted to metallic material, then either use a V600-A86 Attachment (sold separately) or insert a non-metal spacer (such as plastic or resin). The relationship between the distance from the RF Tag to the metal surface and the communications range is shown below. The Attachment is 10 mm thick, and more than one Attachment can be stacked.

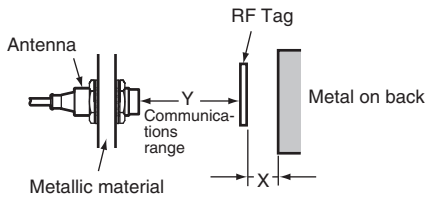
V600-A86 Attachment Installation



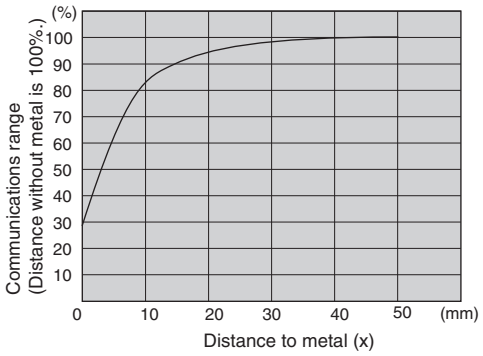
Note: Install so that the mounting holes are aligned.

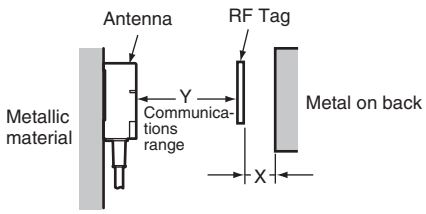
● V680-HS52 and V680-D1KP66T



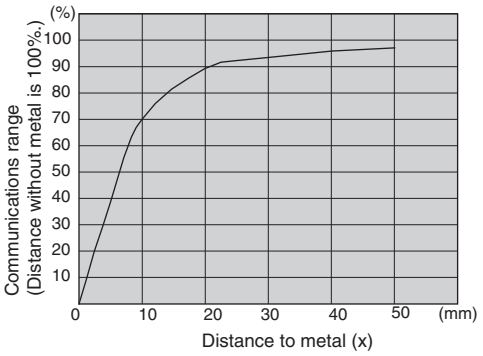


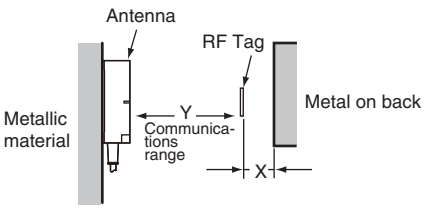
● V680-HS63 and V680-D1KP66T





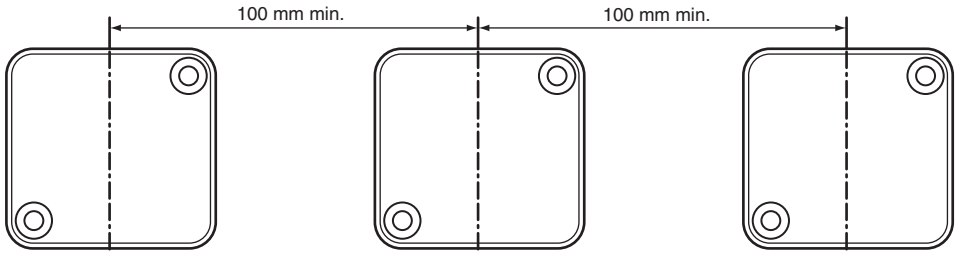
● V680-HS65 and V680-D1KP66T





▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

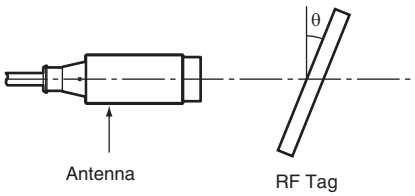
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680-D1KP66T Angle

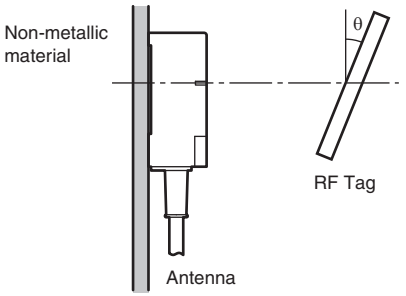
	RF Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D1KP66T	0%	–1%	–2%	–4%	–7%
V680-HS63 and V680-D1KP66T	0%	–2%	–3%	–5%	–9%
V680-HS65 and V680-D1KP66T	0%	–1%	–3%	–6%	–11%

Measurement Conditions

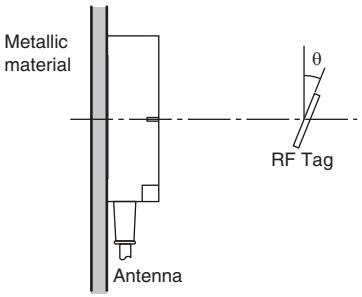
● V680-HS52 and V680-D1KP66T



● V680-HS63 and V680-D1KP66T



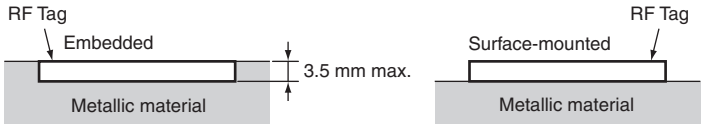
● V680-HS65 and V680-D1KP66T



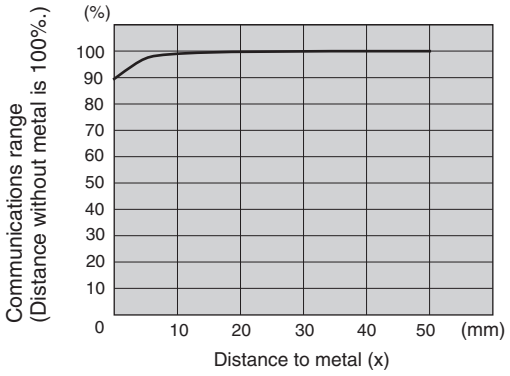
■ V680-D1KP66MT

▪ Effect of Surrounding Metals (Reference)

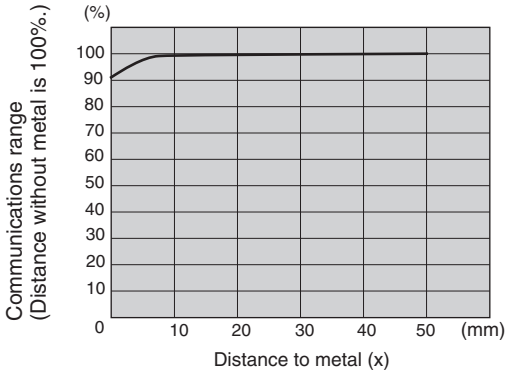
The V680-D1KP66MT can be surface-mounted or it can be embedded in metal. If it is embedded in metal, the height of the metal casing must not exceed that of the RF Tag.



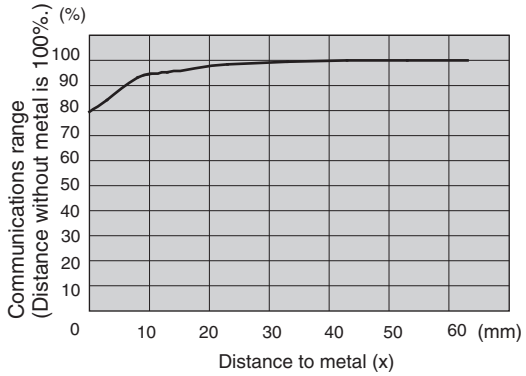
● V680-HS52 and V680-D1KP66MT

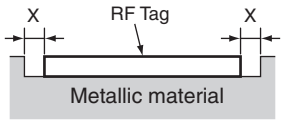


● V680-HS63 and V680-D1KP66MT



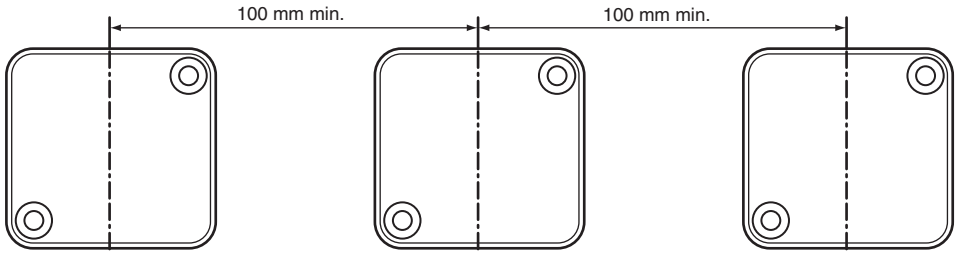
● V680-HS65 and V680-D1KP66MT





▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

Install Antennas and RF Tags as close to parallel to each other as possible.

Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

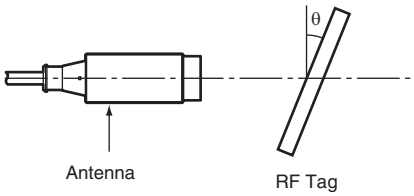
Reduction in Communications Range for V680-D1KP66MT Angle

	RF Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D1KP66MT (Metal on back: Steel)	0%	−1%	−2%	−5%	−9%
V680-HS63 and V680-D1KP66MT (Metal on back: Steel)	0%	−1%	−4%	−7%	−13%
V680-HS65 and V680-D1KP66MT (Metal on back: Steel)	0%	−1%	−6%	−15%	---

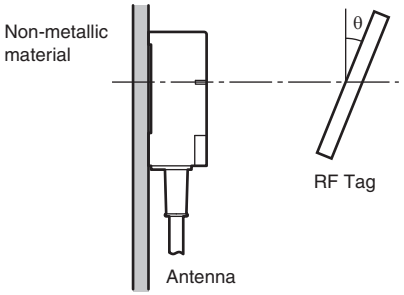
---: Measurement is not possible because Antenna and RF Tag would strike each other.

Measurement Conditions

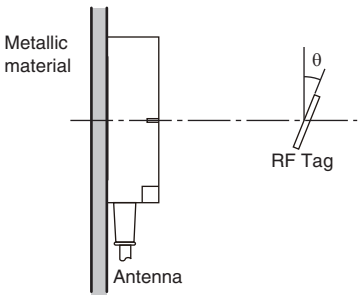
- V680-HS52 and V680-D1KP66MT (Metal on back: Steel)



- V680-HS63 and V680-D1KP66MT (Metal on back: Steel)



- V680-HS65 and V680-D1KP66MT (Metal on back: Steel)



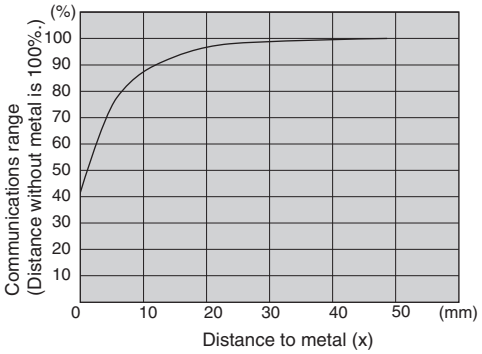
■ V680-D1KP66T-SP

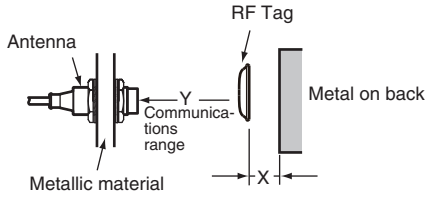
▪ Effect of Metal on Back of RF Tags (Reference)

The V680-D1KP66T-SP communications range is reduced if there is any metallic material on the back of the RF Tag. If the RF Tag is mounted on metallic material, insert a non-metal spacer (such as plastic or resin).

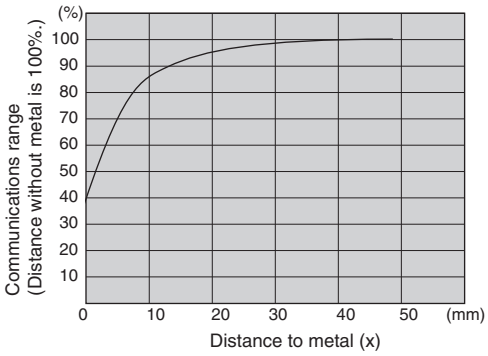
The relationship between the distance from the RF Tag to the metal surface and the communications range is shown below.

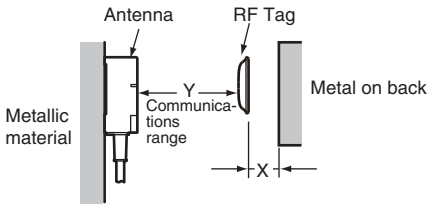
● V680-HS52 and V680-D1KP66T-SP



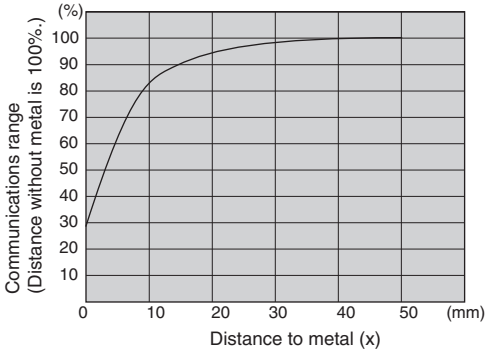


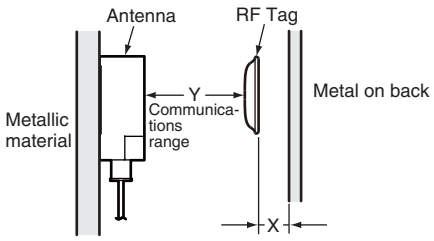
● V680-HS63 and V680-D1KP66T-SP



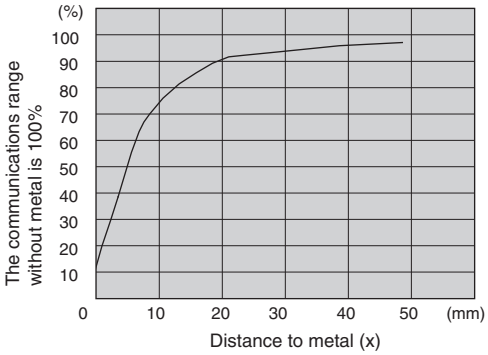


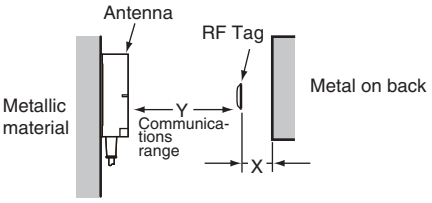
● V680-HS63-SP and V680-D1KP66T-SP





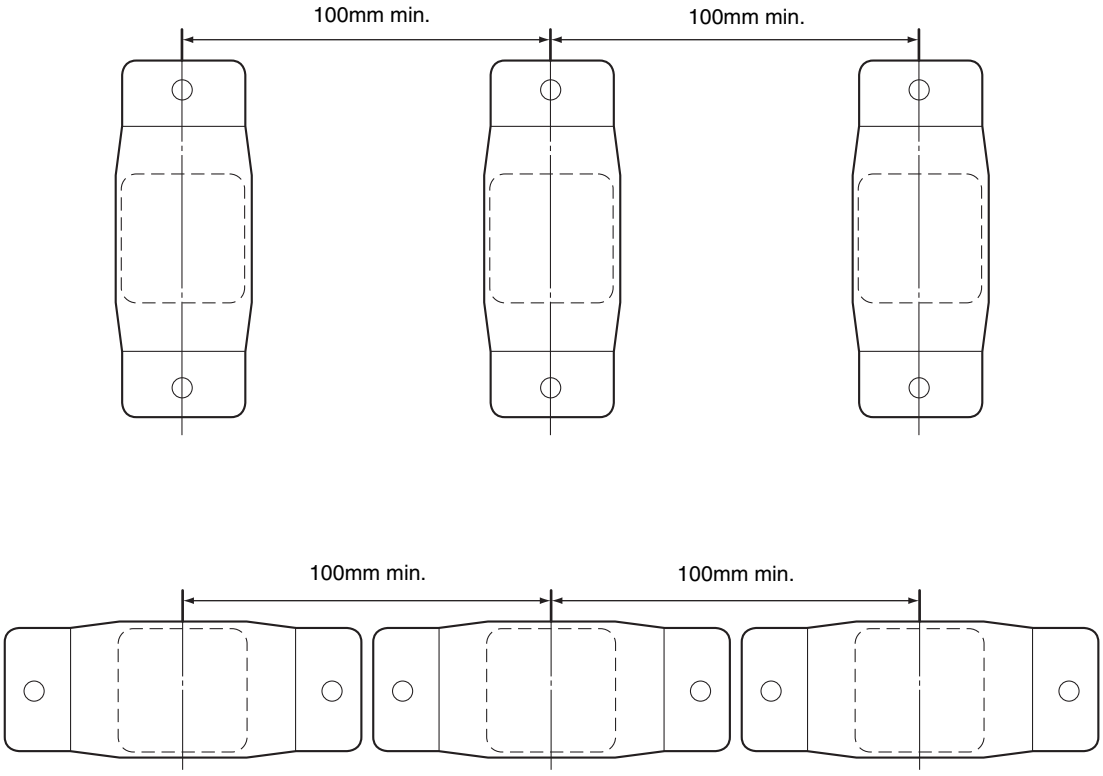
● V680-HS65 and V680-D1KP66T-SP





▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

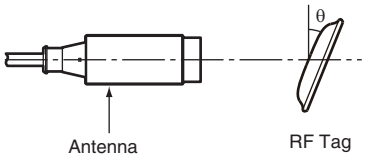
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680-D1KP66T-SP Angle

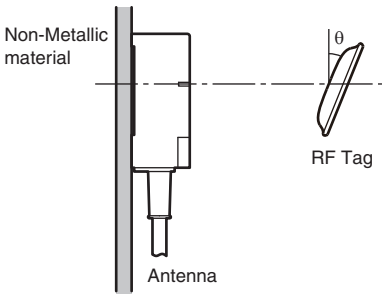
	RF Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D1KP66T-SP	0%	−1%	−2%	−4%	−7%
V680-HS63 and V680-D1KP66T-SP	0%	−2%	−3%	−5%	−9%
V680-HS63-SP and V680-D1KP66T-SP	0%	−2%	−4%	−7%	−12%
V680-HS65 and V680-D1KP66T-SP	0%	−1%	−3%	−6%	−11%

Measurement Conditions

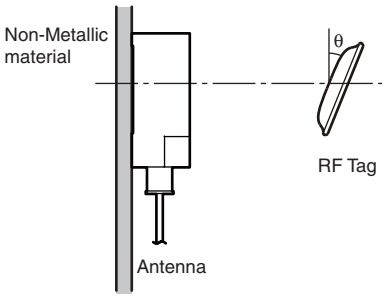
- V680-HS52 and V680-D1KP66T-SP



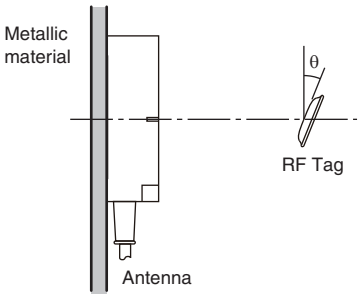
- V680-HS63 and V680-D1KP66T-SP



- V680-HS63-SP and V680-D1KP66T-SP



- V680-HS65 and V680-D1KP66T-SP



■ V680-D2KF52M

▪ Differences in Surrounding Metals

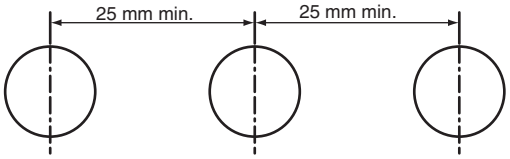
Communications ranges are affected by the type of metal in back of or surrounding the RF Tag, as shown in the following table.

	Steel	SUS	Brass	Aluminum
V680-D2KF52M	100%	80% to 85%	80% to 85%	75% to 80%

Note: The value for steel around or behind the RF Tag is set to 100%.

▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

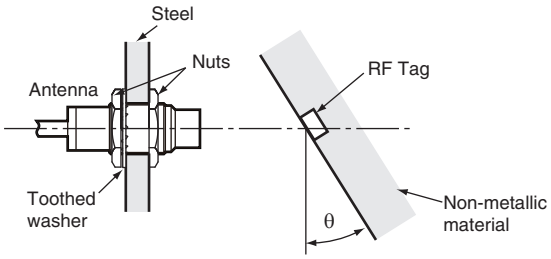
Reduction in Communications Range for V680-D2KF52M Angle

	RF Tag angle (θ°)				
	0	10	20	30	40
V680-HS51 and V680-D2KF52M	0%	–2%	–6%	-–	–22%
V680-HS51 and V680-D2KF52M (Metal on back: Steel)	0%	0%	0%	–7%	–30%
V680-HS52 and V680-D2KF52M	0%	0%	0%	–2%	–5%
V680-HS52 and V680-D2KF52M (Metal on back: Steel)	0%	–2%	–7%	---	---
V680-HS63 and V680-D2KF52M	0%	0%	–1%	–4%	–9%

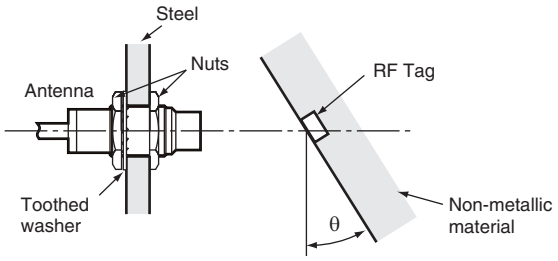
---: Measurement is not possible because Antenna and RF Tag would strike each other.

Measurement Conditions

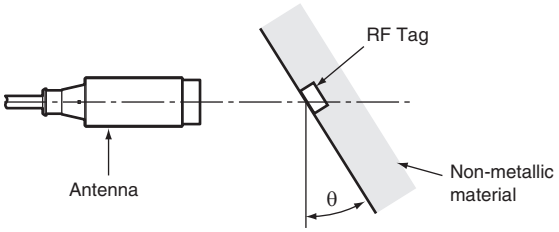
● V680-HS51 and V680-D2KF52M



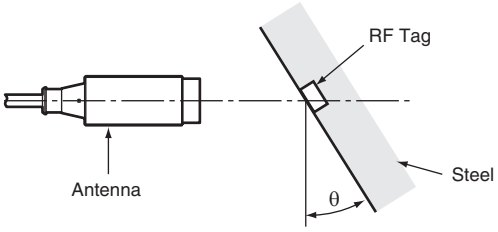
● V680-HS51 and V680-D2KF52M (Metal on back: Steel)



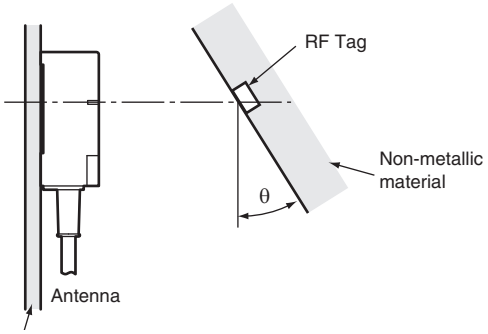
● V680-HS52 and V680-D2KF52M



● V680-HS52 and V680-D2KF52M (Metal on back: Steel)



● V680-HS63 and V680-D2KF52M

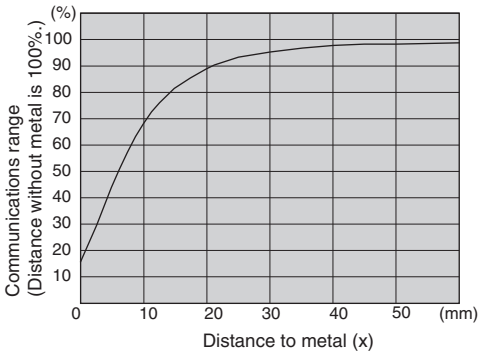


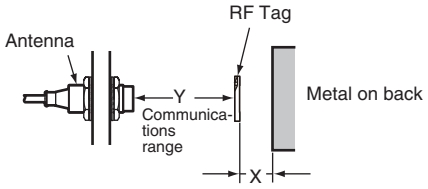
■ V680-D8KF67

▪ Effect of Metal on Back of RF Tags (Reference)

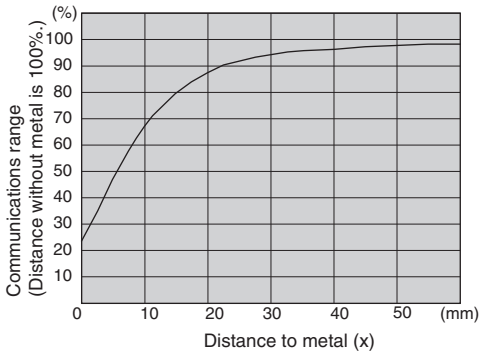
The V680-D8KF67 communications range is reduced if there is any metallic material on the back of the RF Tag.

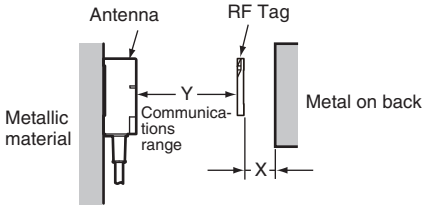
● V680-HS52 and V680-D8KF67



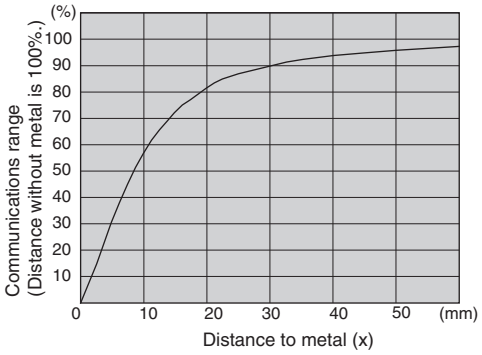


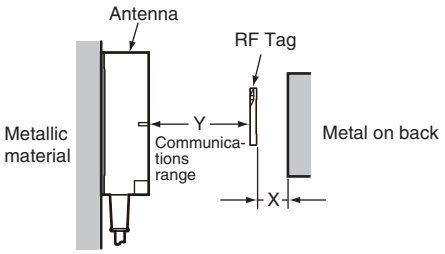
● V680-HS63 and V680-D8KF67





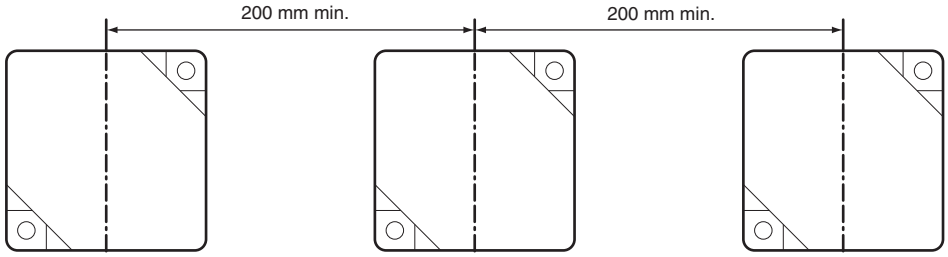
● V680-HS65 and V680-D8KF67





▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

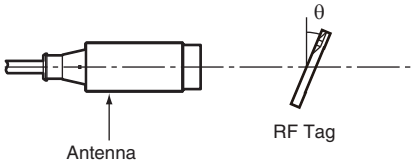
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680-D2KF67 Angle

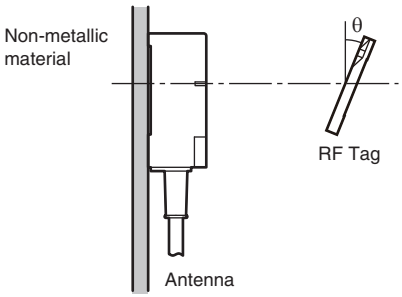
	RF Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D8KF67	0%	-1%	-1%	–1%	–1%
V680-HS63 and V680-D8KF67	0%	–1%	–1%	–2%	–4%
V680-HS65 and V680-D8KF67	0%	–1%	–2%	–5%	–9%

Measurement Conditions

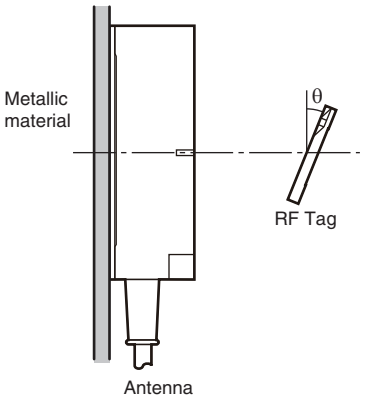
● V680-HS52 and V680-D8KF67



● V680-HS63 and V680-D8KF67



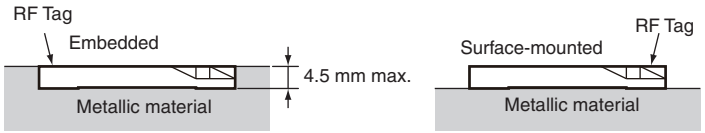
● V680-HS65 and V680-D8KF67



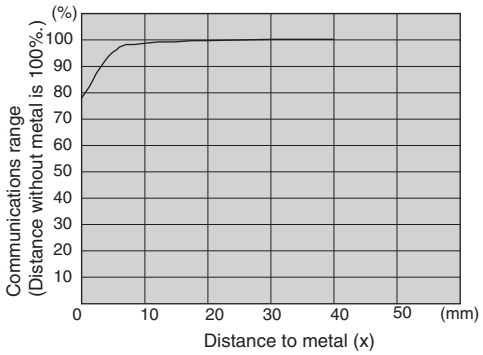
■ V680-D8KF67M

▪ Effect of Surrounding Metals (Reference)

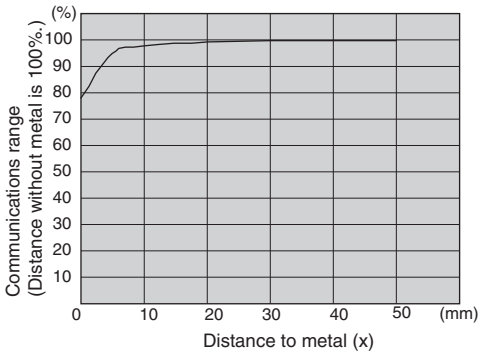
The V680-D8KF67M can be surface-mounted or it can be embedded in metal. If it is embedded in metal, the height of the metal casing must not exceed that of the RF Tag.



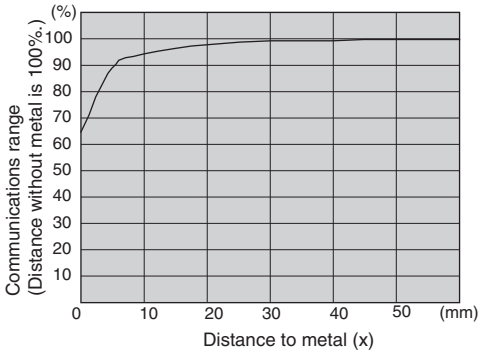
● V680-HS52 and V680-D8KF67M

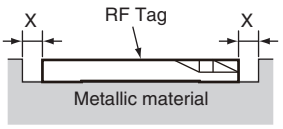


● V680-HS63 and V680-D8KF67M



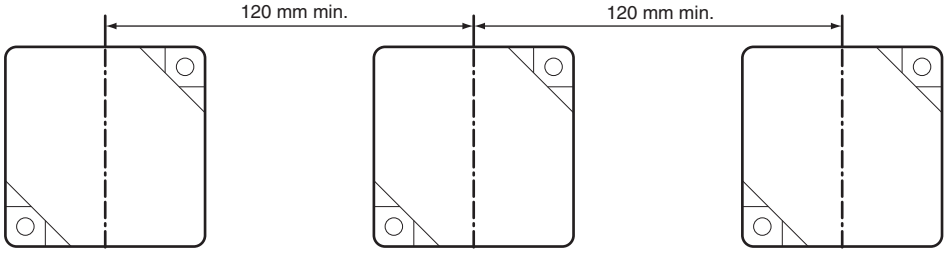
● V680-HS65 and V680-D8KF67M





▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

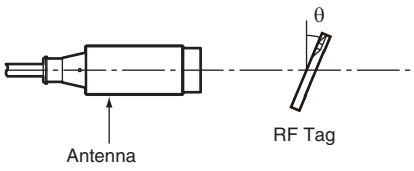
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680-D2KF67M Angle

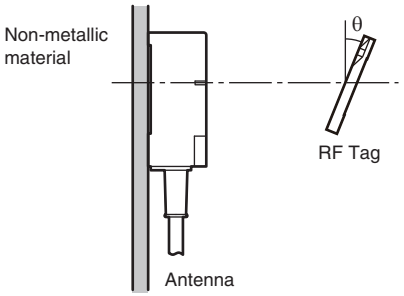
	RF Tag angle (θ°)				
	0	10	20	30	40
V680-HS52 and V680-D8KF67M (Metal on back: Steel)	0%	0%	0%	0%	0%
V680-HS63 and V680-D8KF67M (Metal on back: Steel)	0%	0%	−1%	−2%	−5%
V680-HS65 and V680-D8KF67M (Metal on back: Steel)	0%	−1%	−3%	−9%	−19%

Measurement Conditions

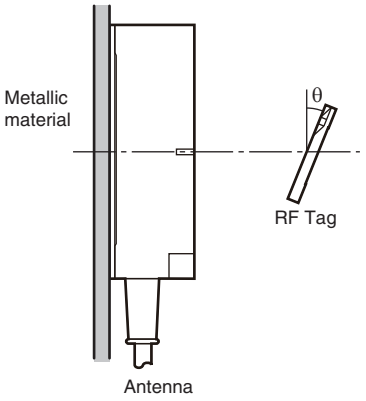
- V680-HS52 and V680-D8KF67M
  (Metal on back: Steel)



- V680-HS63 and V680-D8KF67M
  (Metal on back: Steel)



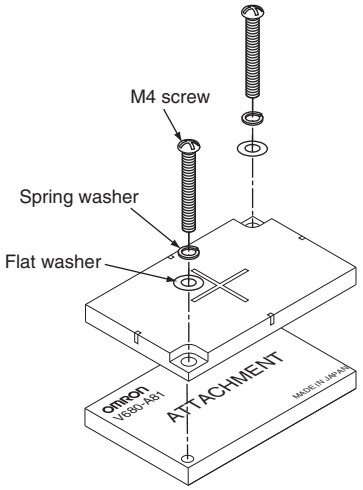
- V680-HS65 and V680-D8KF67M
  (Metal on back: Steel)



■ V680-D8KF67/-D32KF68

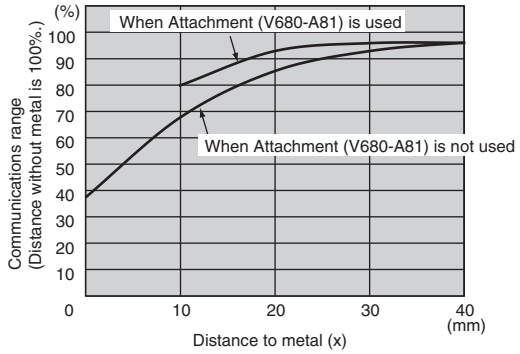
▪ Effect of Surrounding Metals (Reference)

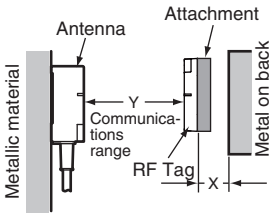
² Special Attachment (V680-A81) Installation Direction



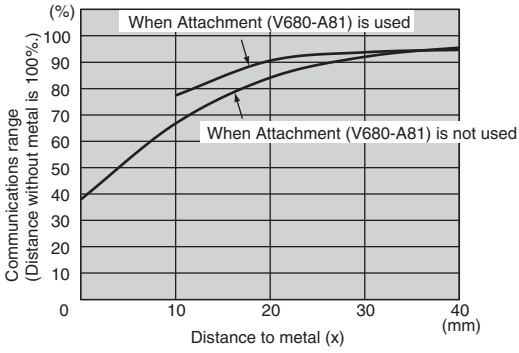
The communications range will be reduced if there is metal on the back of an ID Tag. When mounting on a metal surface, use the V680-A81 special Attachment (sold separately) or insert a non-metallic spacer (e.g., plastic, resin, etc.).

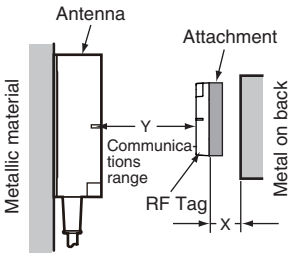
● V680-HS63 and V680-D8KF68/-D32KF68





● V680-HS65 and V680-D8KF68/-D32KF68

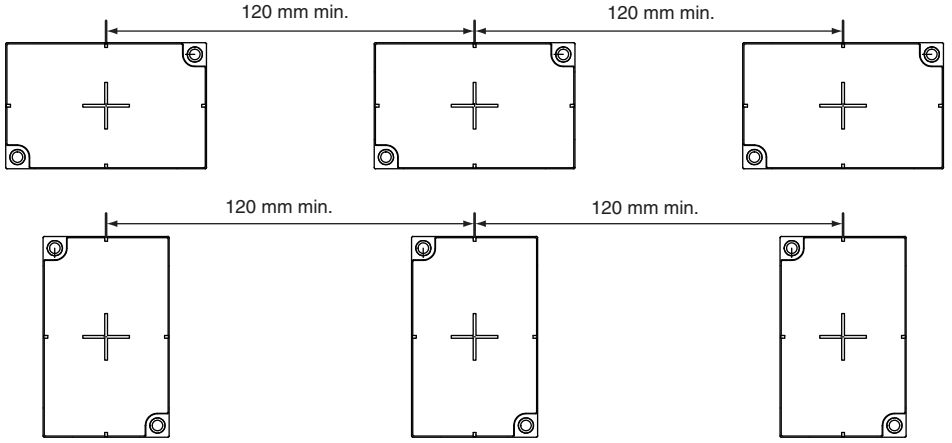




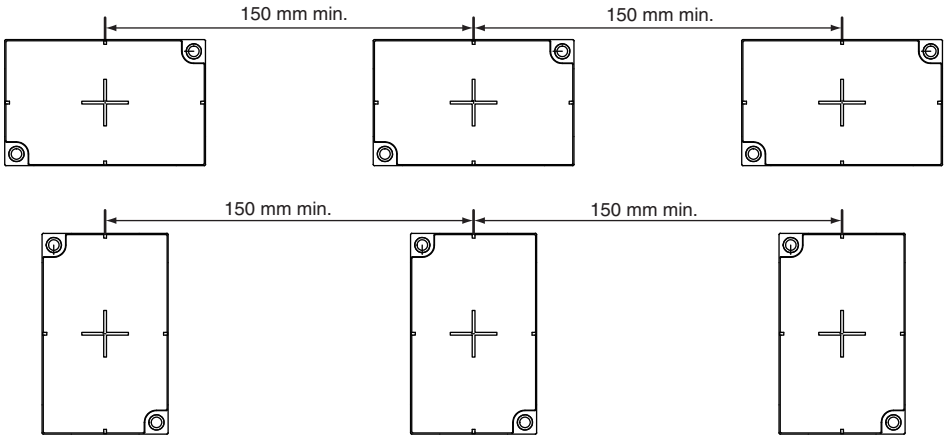
▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.

When V680-HS63 Is Used



When V680-HS65 Is Used



▪ Influence of RF Tag Angle (Reference)

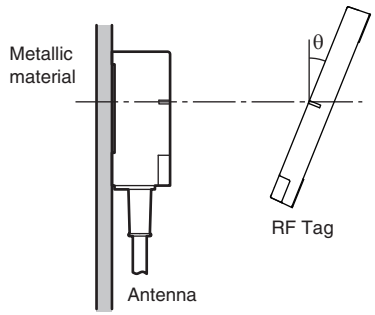
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680-D8KF68/-D32KF68 Angle

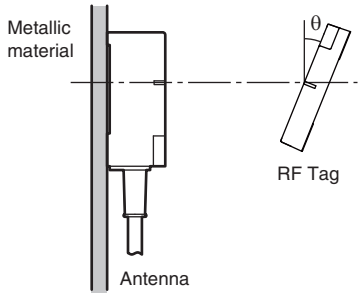
	RF Tag angle (θ°)				
	0	10	20	30	40
V680-HS63 and V680-D8KF68/-D32KF68 (Horizontal-facing RF Tag)	0%	0%	0%	0%	0%
V680-HS63 and V680-D8KF68/-D32KF68 (Vertical-facing RF Tag)	0%	−1%	−2%	−3%	−5%
V680-HS65 and V680-D8KF68/-D32KF68 (Horizontal-facing RF Tag)	0%	−1%	−2%	−4%	−6%
V680-HS65 and V680-D8KF68/-D32KF68 (Vertical-facing RF Tag)	0%	−1%	−3%	−6%	−10%

Measurement Conditions

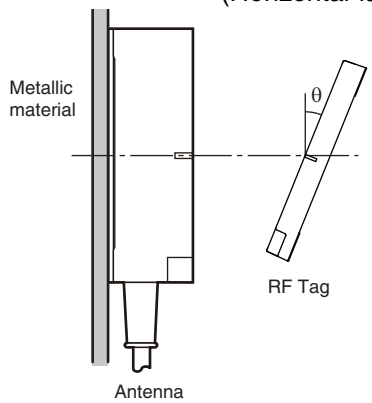
- V680-HS63 and V680-D8KF68/-D32KF68 (Horizontal-facing RF Tag)



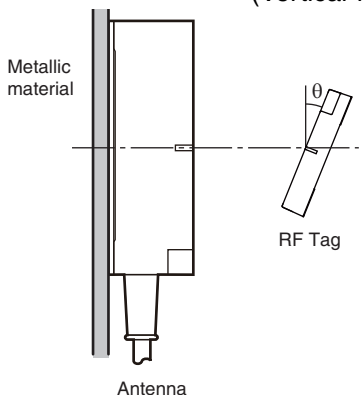
- V680-HS63 and V680-D8KF68/-D32KF68 (Vertical-facing RF Tag)



- V680-HS65 and V680-D8KF68/-D32KF68 (Horizontal-facing RF Tag)



- V680-HS65 and V680-D8KF68/-D32KF68 (Vertical-facing RF Tag)

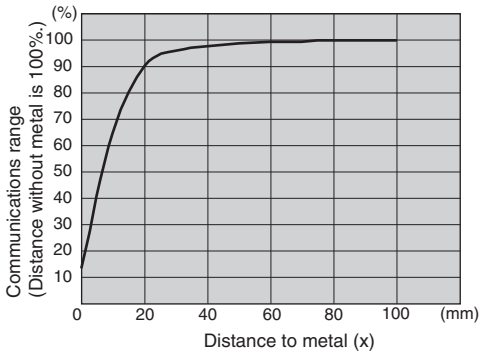


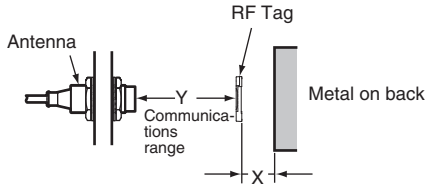
■ V680S-D2KF67

▪ Effect of Metal on Back of RF Tags (Reference)

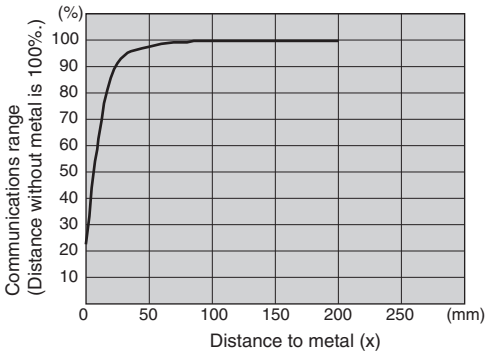
The V680S-D2KF67 communications range is reduced if there is any metallic material on the back of the RF Tag.

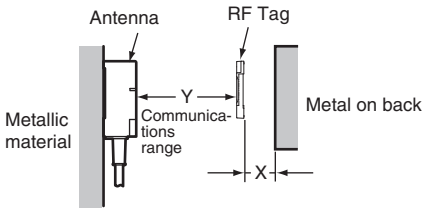
● V680-HS52 and V680S-D2KF67



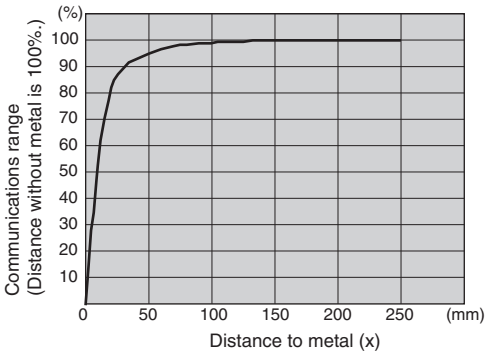


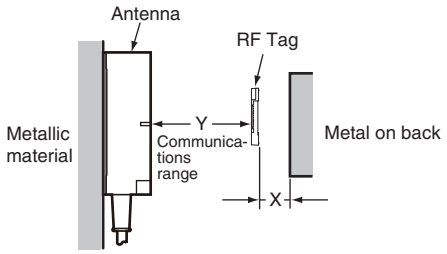
● V680-HS63 and V680S-D2KF67





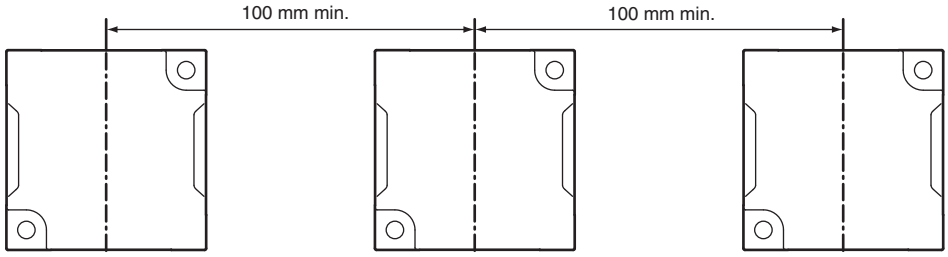
● V680-HS65 and V680S-D2KF67





▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

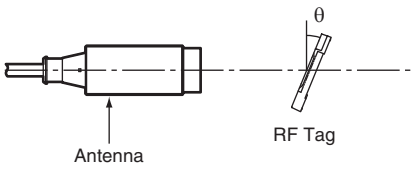
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680S-D2KF67 Angle

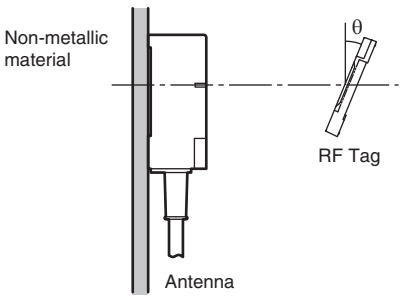
	RF Tag angle (θ°)									
	0	10	20	30	40	50	60	70	80	90
V680-HS52 and V680S-D2KF67	0%	-1%	-2%	-3%	-5%	-9%	-15%	-24%	---	---
V680-HS63 and V680S-D2KF67	0%	-1%	-2%	-4%	-7%	-12%	-18%	---	---	---
V680-HS65 and V680S-D2KF67	0%	-1%	-2%	-4%	-7%	-12%	-19%	-29%	-45%	---

Measurement Conditions

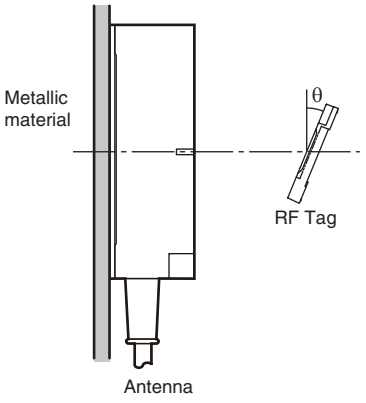
- V680-HS52 and V680S-D2KF67



- V680-HS63 and V680S-D2KF67



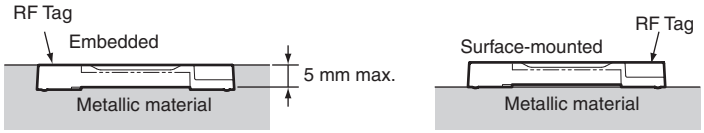
- V680-HS65 and V680S-D2KF67



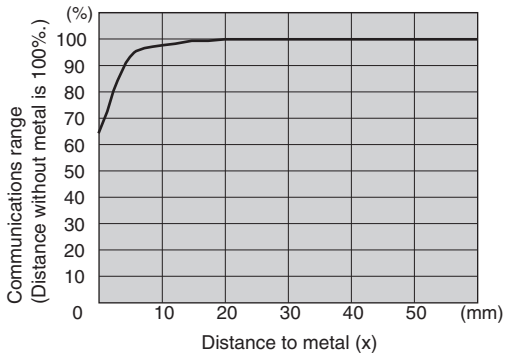
■ V680S-D2KF67M

▪ Effect of Surrounding Metals (Reference)

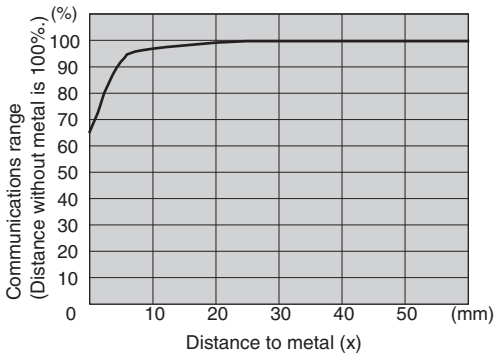
The V680S-D2KF67M can be surface-mounted or it can be embedded in metal. If it is embedded in metal, the height of the metal casing must not exceed that of the RF Tag.



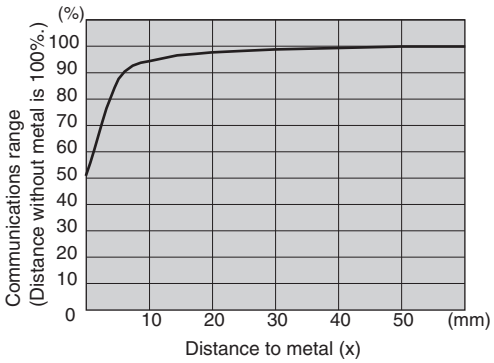
● V680-HS52 and V680S-D2KF67M

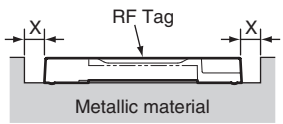


● V680-HS63 and V680S-D2KF67M



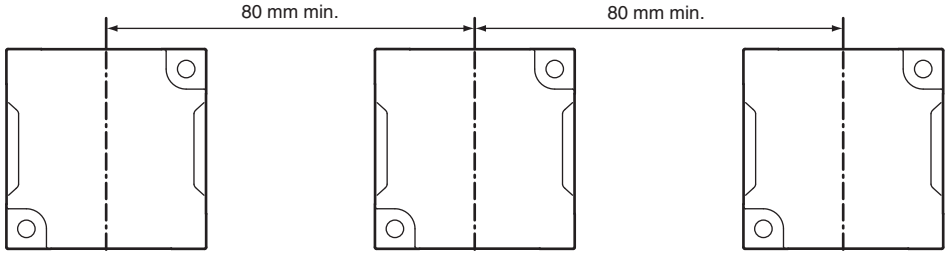
● V680-HS65 and V680S-D2KF67M





▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

Install Antennas and RF Tags as close to parallel to each other as possible.

Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

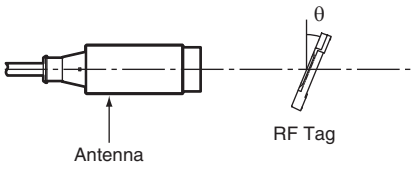
Reduction in Communications Range for V680S-D2KF67M Angle

	RF Tag angle (θ°)									
	0	10	20	30	40	50	60	70	80	90
V680-HS52 and V680S-D2KF67M (Metal on back: Steel)	0%	-1%	-2%	-4%	-6%	-11%	---	---	---	---
V680-HS63 and V680S-D2KF67M (Metal on back: Steel)	0%	-1%	-3%	-7%	-12%	-18%	-29%	-50%	---	---
V680-HS65 and V680S-D2KF67M (Metal on back: Steel)	0%	-2%	-5%	11%	-21%	-36%	---	---	---	---

Measurement Conditions

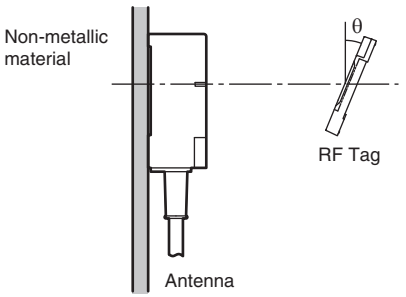
● V680-HS52 and V680S-D2KF67M

(Metal on back: Steel)



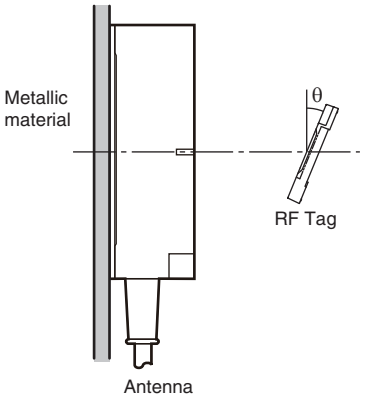
● V680-HS63 and V680S-D2KF67M

(Metal on back: Steel)



● V680-HS65 and V680S-D2KF67M

(Metal on back: Steel)

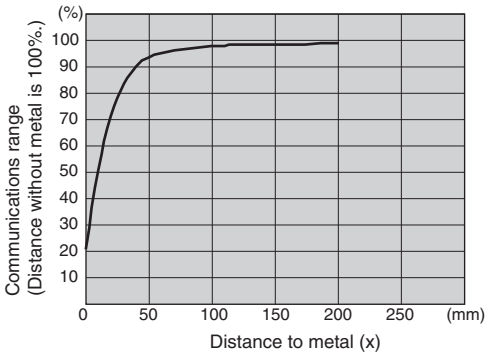


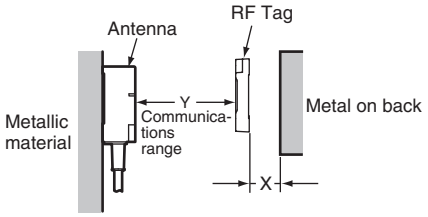
■ V680S-D2KF68

▪ Effect of Metal on Back of RF Tags (Reference)

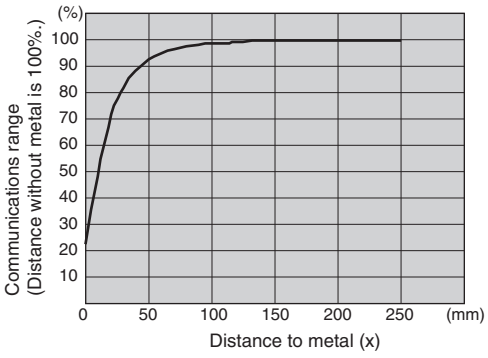
The V680S-D2KF68 communications range is reduced if there is any metallic material on the back of the RF Tag.

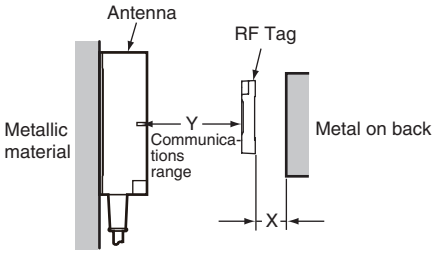
● V680-HS63 and V680S-D2KF68





● V680-HS65 and V680S-D2KF68

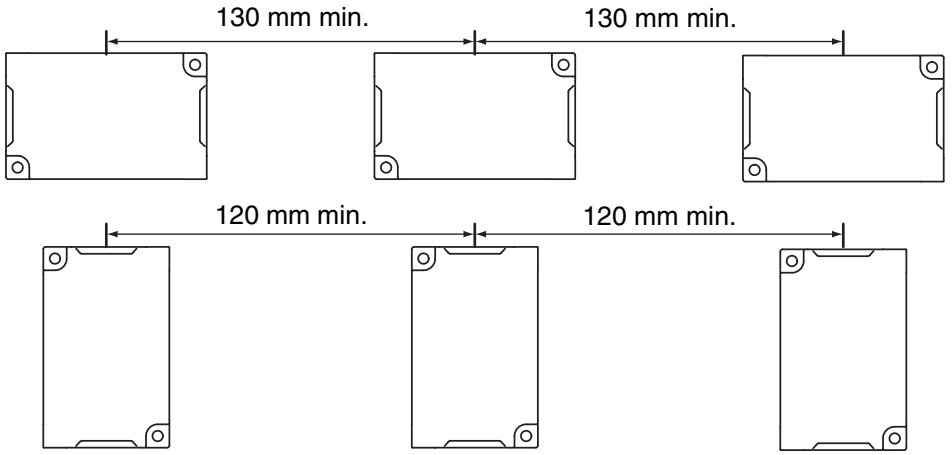




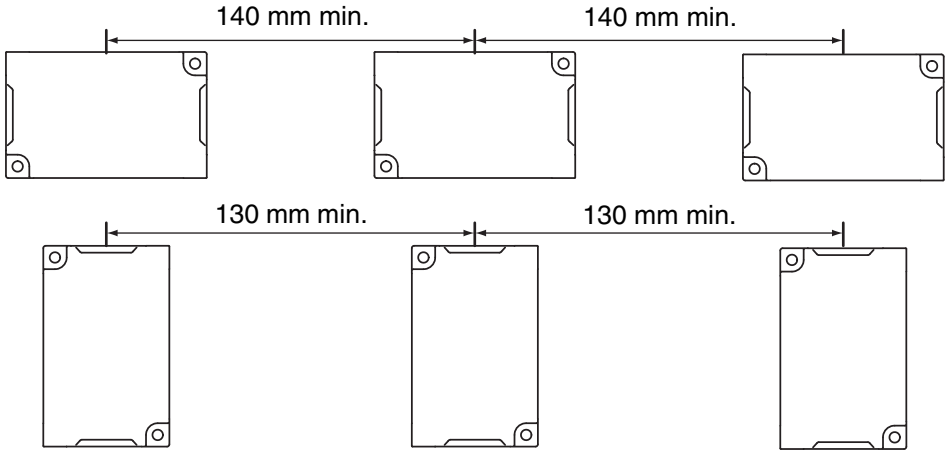
▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.

When V680-HS63 Is Used



When V680-HS65 Is Used



▪ Influence of RF Tag Angle (Reference)

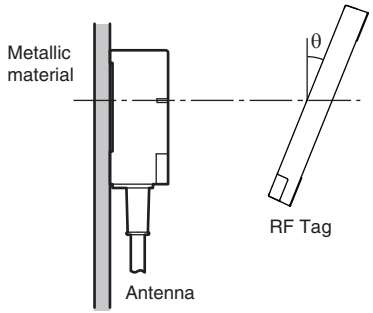
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680S-D2KF68 Angle

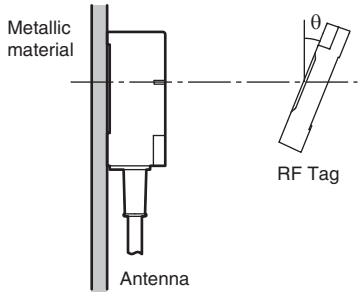
	RF Tag angle (θ°)									
	0	10	20	30	40	50	60	70	80	90
V680-HS63 and V680S-D2KF68 (Horizontal-facing RF Tag)	0%	-1%	-1%	-1%	-1%	-1%	-3%	-8%	-16%	---
V680-HS63 and V680S-D2KF68 (Vertical-facing RF Tag)	0%	-1%	-2%	-4%	-7%	-11%	-17%	-25%	-37%	-58%
V680-HS65 and V680S-D2KF68 (Horizontal-facing RF Tag)	0%	-1%	-2%	-3%	-6%	-9%	-15%	-22%	-35%	-60%
V680-HS65 and V680S-D2KF68 (Vertical-facing RF Tag)	0%	-1%	-3%	-5%	-9%	-13%	-20%	-29%	-44%	-72%

Measurement Conditions

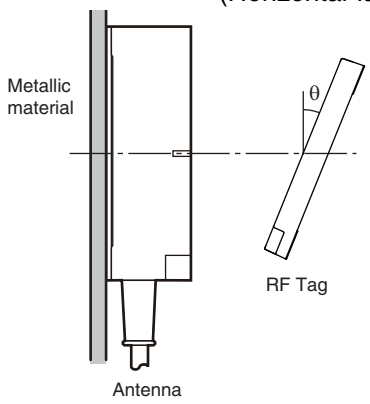
● V680-HS63 and V680S-D2KF68 (Horizontal-facing RF Tag)



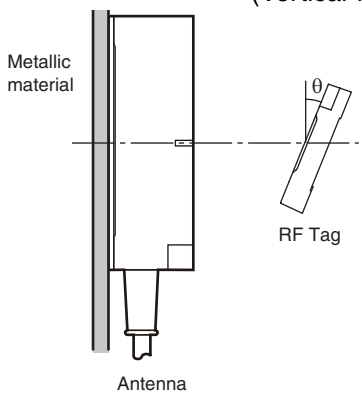
● V680-HS63 and V680S-D2KF68 (Vertical-facing RF Tag)



● V680-HS65 and V680S-D2KF68 (Horizontal-facing RF Tag)



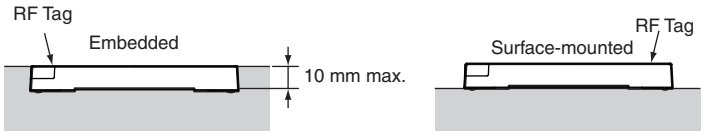
● V680-HS65 and V680S-D2KF68 (Vertical-facing RF Tag)



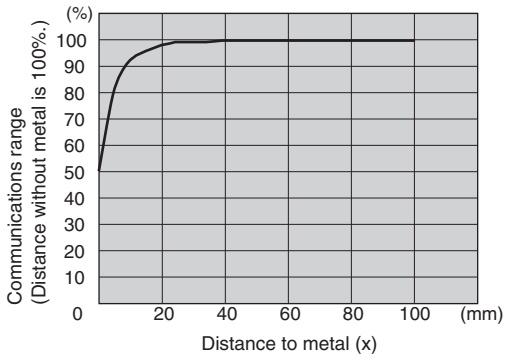
■ V680S-D2KF68M

▪ Effect of Surrounding Metals (Reference)

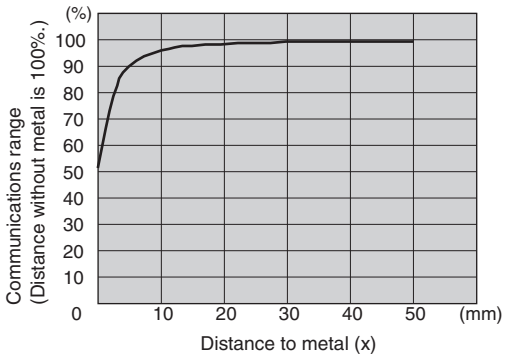
The V680S-D2KF68M can be surface-mounted or it can be embedded in metal. If it is embedded in metal, the height of the metal casing must not exceed that of the RF Tag.

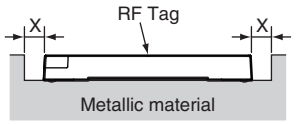


● V680-HS63 and V680S-D2KF68M



● V680-HS65 and V680S-D2KF68M

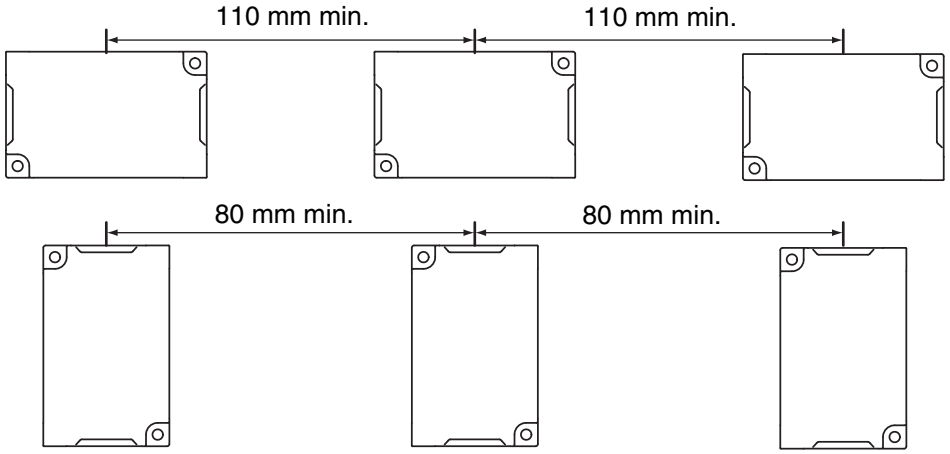




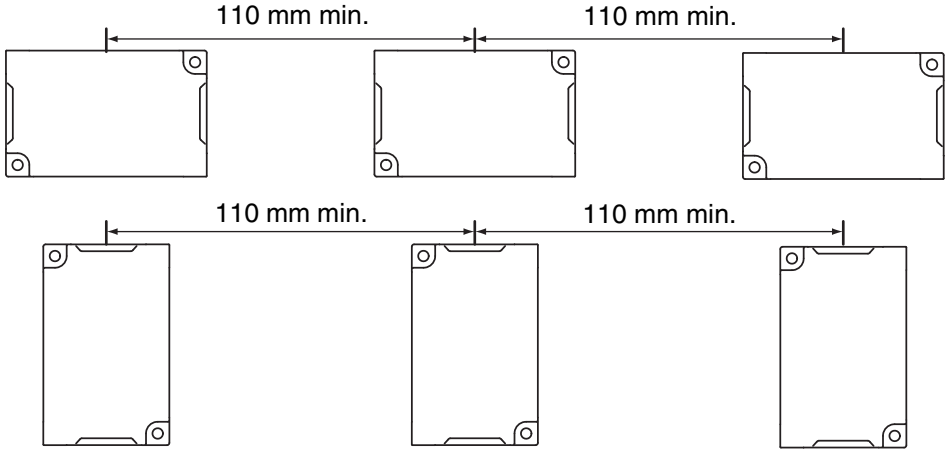
▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.

When V680-HS63 Is Used



When V680-HS65 Is Used



▪ Influence of RF Tag Angle (Reference)

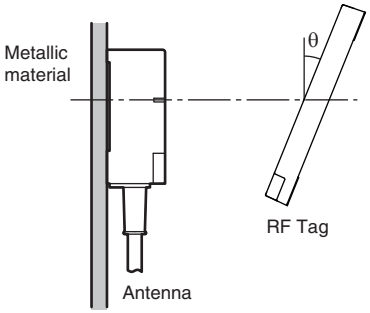
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680S-D2KF68M Angle

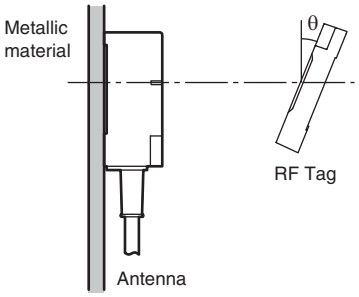
	RF Tag angle (θ°)									
	0	10	20	30	40	50	60	70	80	90
V680-HS63 and V680S-D2KF68M(Horizontal-facing RF Tag) (Metal on back: Steel)	0%	0%	0%	0%	0%	0%	0%	-5%	-14%	---
V680-HS63 and V680S-D2KF68M(Vertical-facing RF Tag) (Metal on back: Steel)	0%	-1%	-2%	-5%	-8%	-14%	-23%	-36%	---	---
V680-HS65 and V680S-D2KF68M(Horizontal-facing RF Tag) (Metal on back: Steel)	0%	-1%	-2%	-4%	-7%	-12%	-21%	-41%	---	---
V680-HS65 and V680S-D2KF68M(Vertical-facing RF Tag) (Metal on back: Steel)	0%	-1%	-3%	-6%	-12%	-20%	-32%	-59%	-65%	---

Measurement Conditions

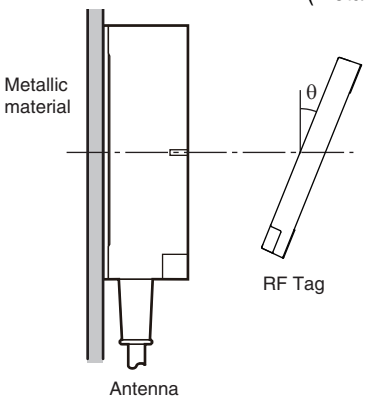
● V680-HS63 and V680S-D2KF68(Horizontal-facing RF Tag) (Metal on back: Steel)



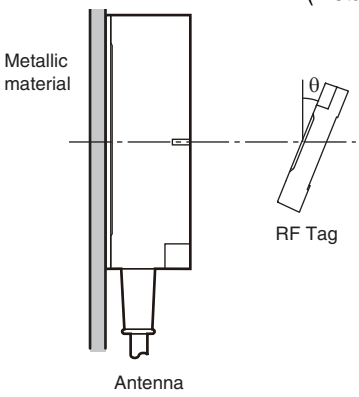
● V680-HS63 and V680S-D2KF68(Vertical-facing RF Tag) (Metal on back: Steel)



● V680-HS65 and V680S-D2KF68(Horizontal-facing RF Tag) (Metal on back: Steel)



● V680-HS65 and V680S-D2KF68(Vertical-facing RF Tag) (Metal on back: Steel)

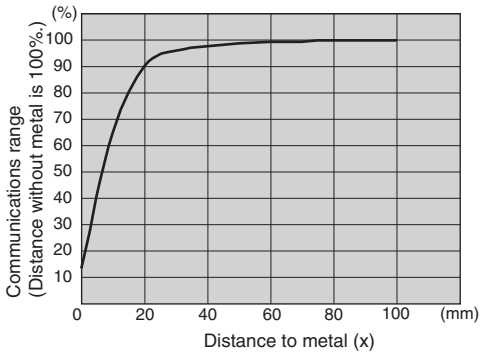


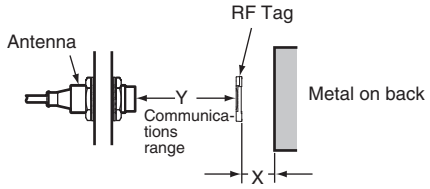
■ V680S-D8KF67

▪ Effect of Metal on Back of RF Tags (Reference)

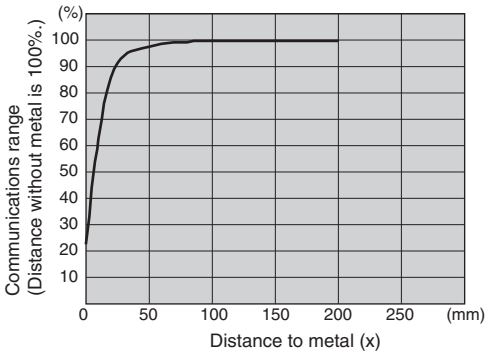
The V680S-D8KF67 communications range is reduced if there is any metallic material on the back of the RF Tag.

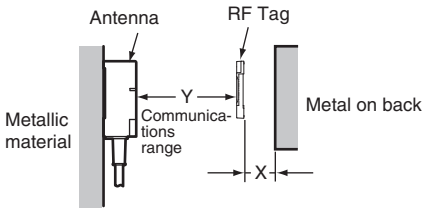
● V680-HS52 and V680S-D8KF67



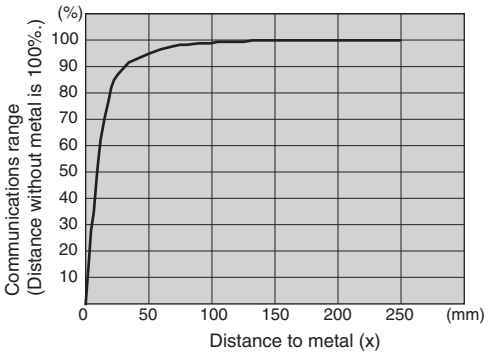


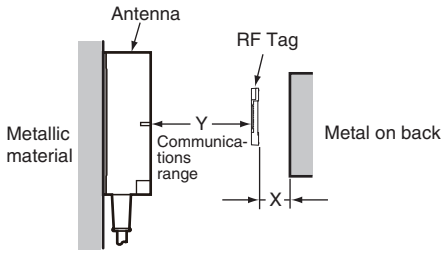
● V680-HS63 and V680S-D8KF67





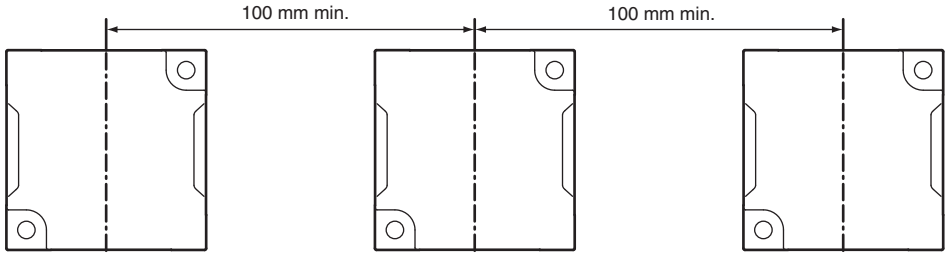
● V680-HS65 and V680S-D8KF67





▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

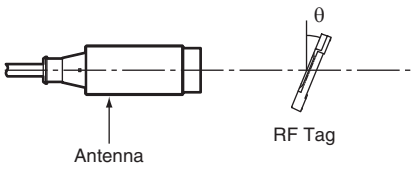
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680S-D8KF67 Angle

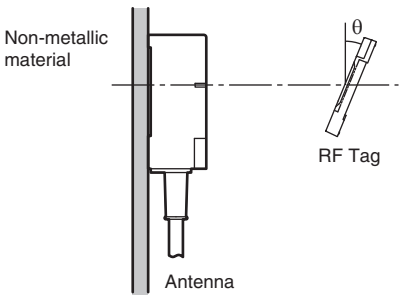
	RF Tag angle (θ°)									
	0	10	20	30	40	50	60	70	80	90
V680-HS52 and V680S-D8KF67	0%	-1%	-2%	-3%	-5%	-9%	-15%	-24%	---	---
V680-HS63 and V680S-D8KF67	0%	-1%	-2%	-4%	-7%	-12%	-18%	---	---	---
V680-HS65 and V680S-D8KF67	0%	-1%	-2%	-4%	-7%	-12%	-19%	-29%	-45%	---

Measurement Conditions

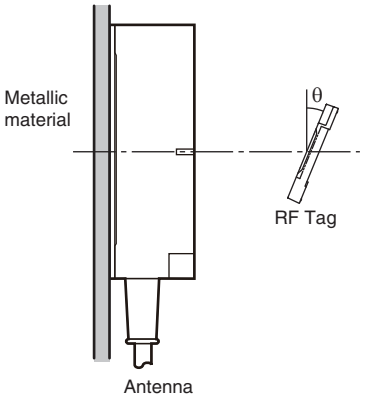
- V680-HS52 and V680S-D8KF67



- V680-HS63 and V680S-D8KF67



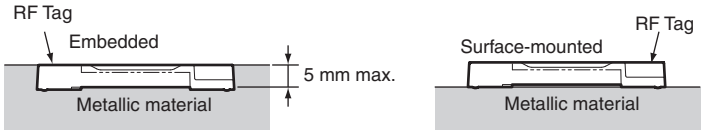
- V680-HS65 and V680S-D8KF67



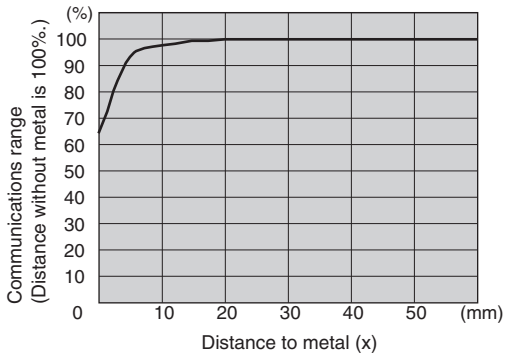
■ V680S-D8KF67M

▪ Effect of Surrounding Metals (Reference)

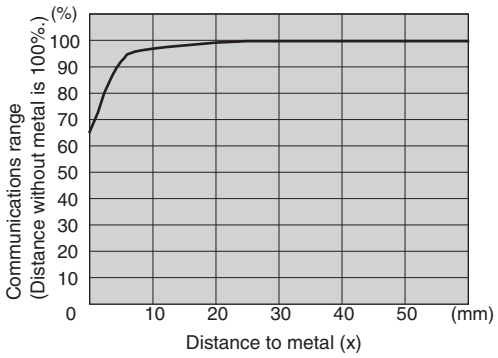
The V680S-D8KF67M can be surface-mounted or it can be embedded in metal. If it is embedded in metal, the height of the metal casing must not exceed that of the RF Tag.



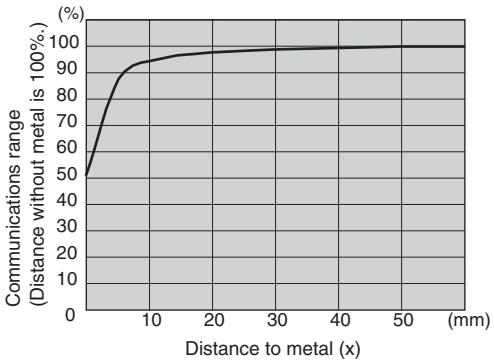
● V680-HS52 and V680S-D8KF67M

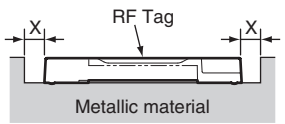


● V680-HS63 and V680S-D8KF67M



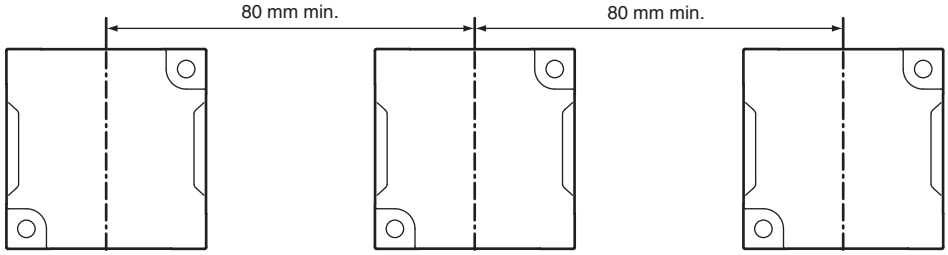
● V680-HS65 and V680S-D8KF67M





▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.



▪ Influence of RF Tag Angle (Reference)

Install Antennas and RF Tags as close to parallel to each other as possible.

Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

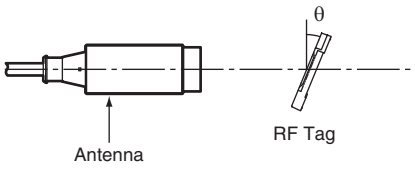
Reduction in Communications Range for V680S-D8KF67M Angle

	RF Tag angle (θ°)									
	0	10	20	30	40	50	60	70	80	90
V680-HS52 and V680S-D8KF67M (Metal on back: Steel)	0%	-1%	-2%	-4%	-6%	-11%	---	---	---	---
V680-HS63 and V680S-D8KF67M (Metal on back: Steel)	0%	-1%	-3%	-7%	-12%	-18%	-29%	-50%	---	---
V680-HS65 and V680S-D8KF67M (Metal on back: Steel)	0%	-2%	-5%	11%	-21%	-36%	---	---	---	---

Measurement Conditions

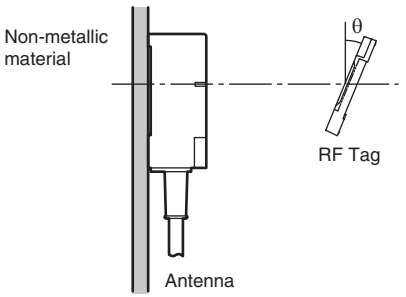
● V680-HS52 and V680S-D8KF67M

(Metal on back: Steel)



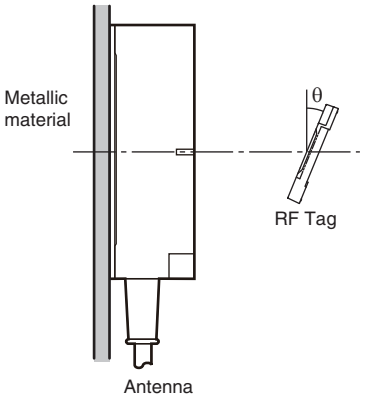
● V680-HS63 and V680S-D8KF67M

(Metal on back: Steel)



● V680-HS65 and V680S-D8KF67M

(Metal on back: Steel)

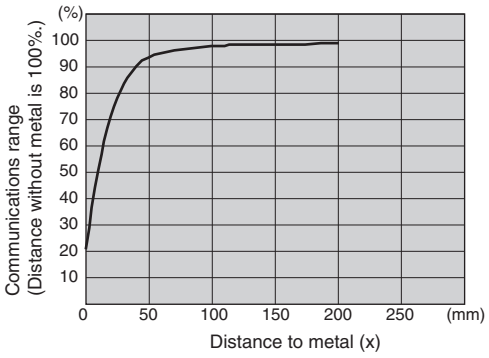


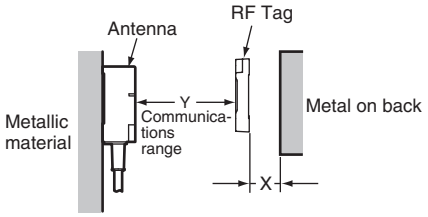
■ V680S-D8KF68

▪ Effect of Metal on Back of RF Tags (Reference)

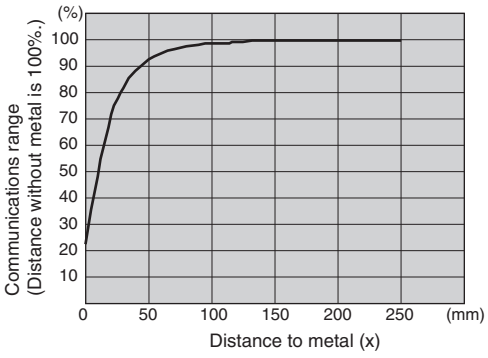
The V680S-D8KF68 communications range is reduced if there is any metallic material on the back of the RF Tag.

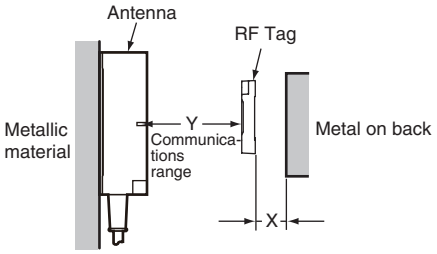
● V680-HS63 and V680S-D8KF68





● V680-HS65 and V680S-D8KF68

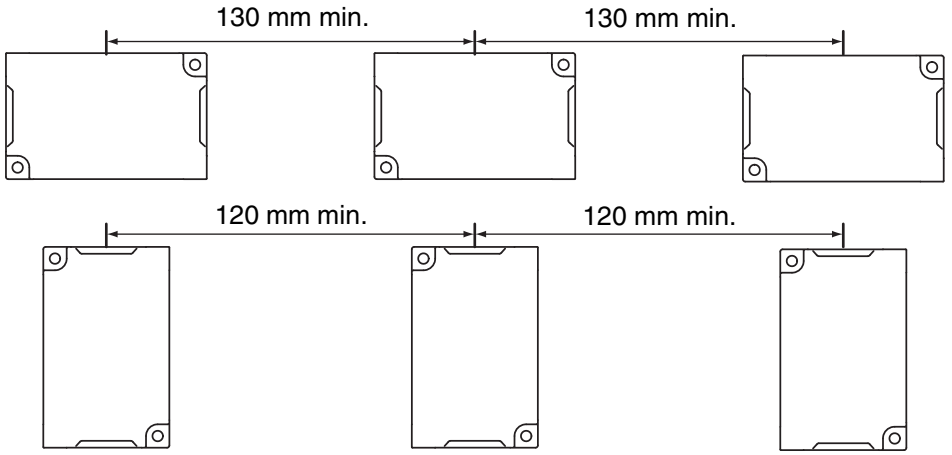




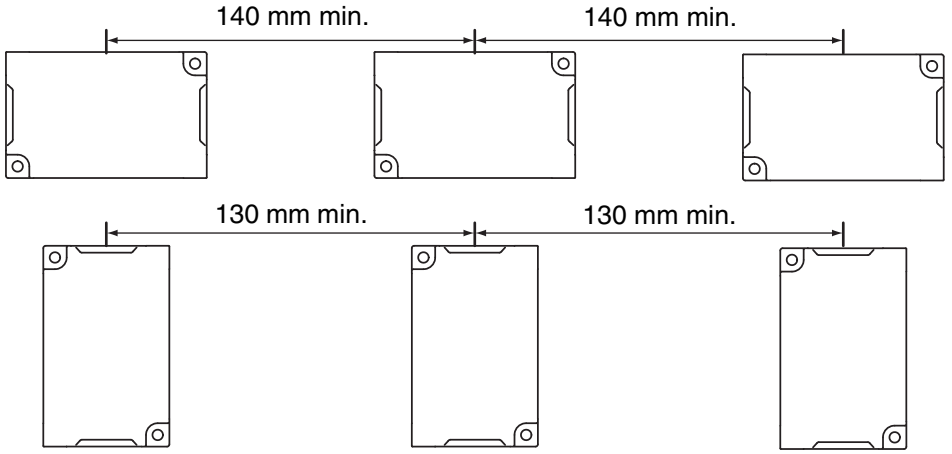
▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.

When V680-HS63 Is Used



When V680-HS65 Is Used



▪ Influence of RF Tag Angle (Reference)

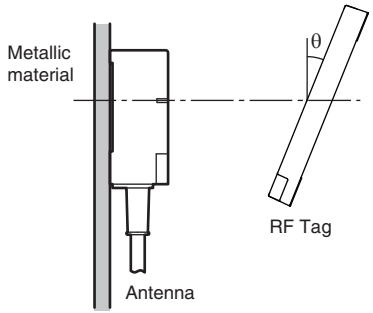
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680S-D8KF68 Angle

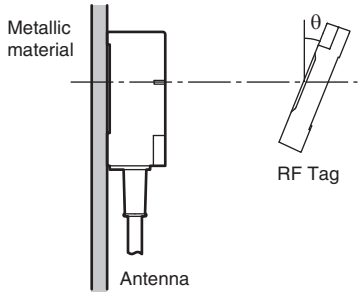
	RF Tag angle (θ°)									
	0	10	20	30	40	50	60	70	80	90
V680-HS63 and V680S-D8KF68 (Horizontal-facing RF Tag)	0%	-1%	-1%	-1%	-1%	-1%	-3%	-8%	-16%	---
V680-HS63 and V680S-D8KF68 (Vertical-facing RF Tag)	0%	-1%	-2%	-4%	-7%	-11%	-17%	-25%	-37%	-58%
V680-HS65 and V680S-D8KF68 (Horizontal-facing RF Tag)	0%	-1%	-2%	-3%	-6%	-9%	-15%	-22%	-35%	-60%
V680-HS65 and V680S-D8KF68 (Vertical-facing RF Tag)	0%	-1%	-3%	-5%	-9%	-13%	-20%	-29%	-44%	-72%

Measurement Conditions

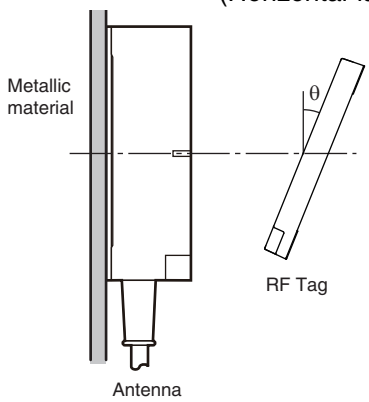
- V680-HS63 and V680S-D8KF68 (Horizontal-facing RF Tag)



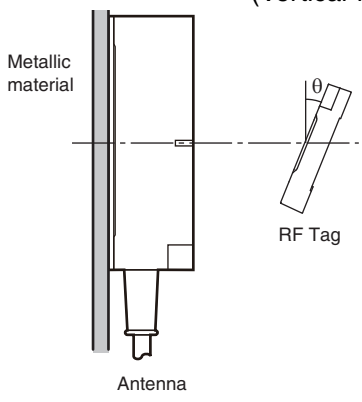
- V680-HS63 and V680S-D8KF68 (Vertical-facing RF Tag)



- V680-HS65 and V680S-D8KF68 (Horizontal-facing RF Tag)



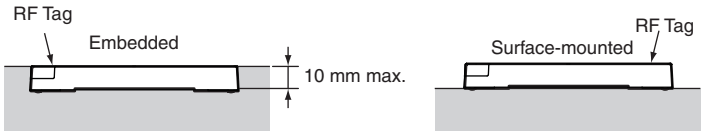
- V680-HS65 and V680S-D8KF68 (Vertical-facing RF Tag)



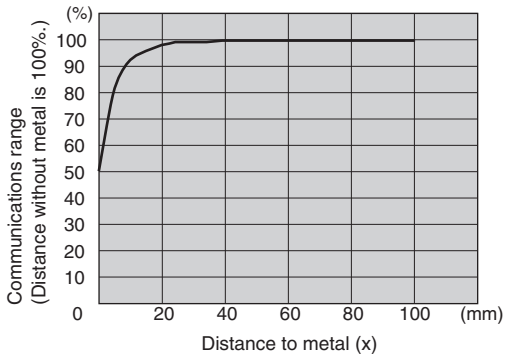
■ V680S-D8KF68M

▪ Effect of Surrounding Metals (Reference)

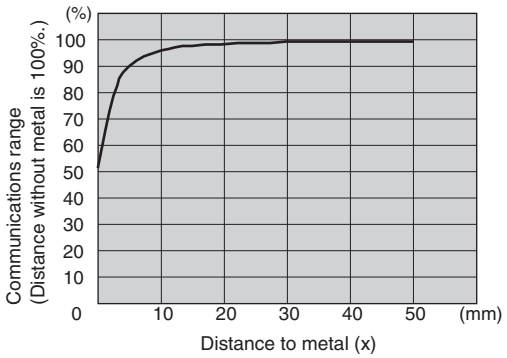
The V680S-D8KF68M can be surface-mounted or it can be embedded in metal. If it is embedded in metal, the height of the metal casing must not exceed that of the RF Tag.

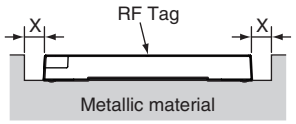


● V680-HS63 and V680S-D8KF68M



● V680-HS65 and V680S-D8KF68M

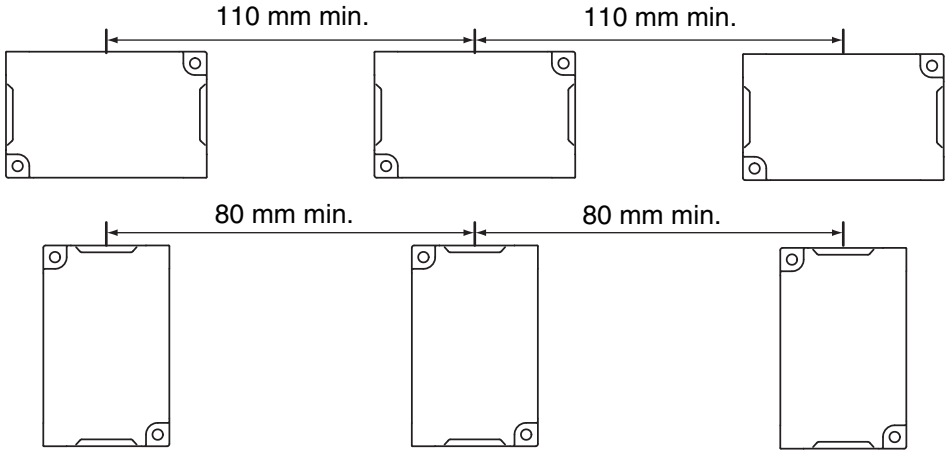




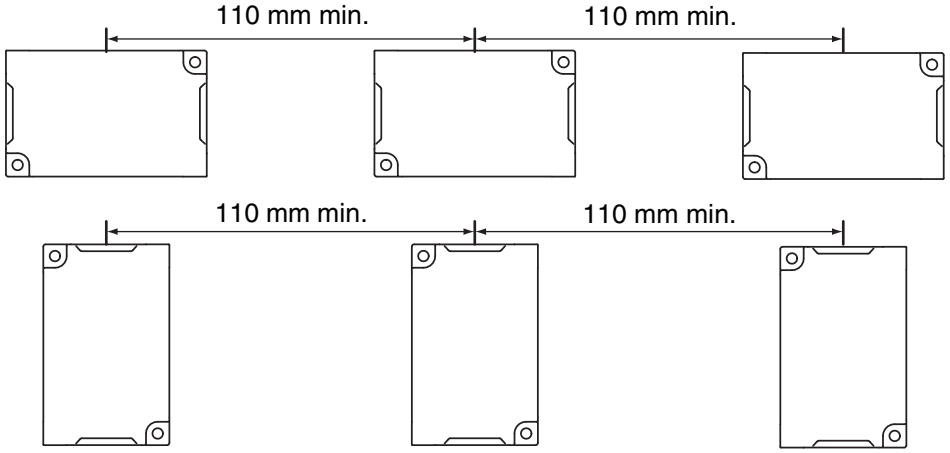
▪ Mutual Interference with RF Tags (Reference)

To prevent malfunctioning due to mutual interference when using more than one RF Tag, leave sufficient space between them as shown in the following diagram.

When V680-HS63 Is Used



When V680-HS65 Is Used



▪ Influence of RF Tag Angle (Reference)

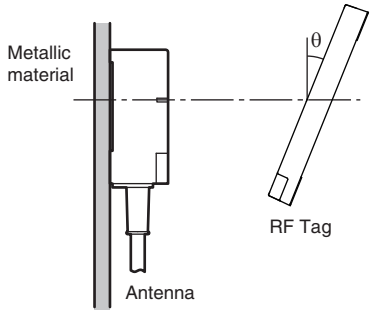
Install Antennas and RF Tags as close to parallel to each other as possible.
Communications are possible even when an Antenna and an RF Tag are mounted at an angle, but the communications range will be shortened. The relation between the angle and the communications range is shown below.

Reduction in Communications Range for V680S-D8KF68M Angle

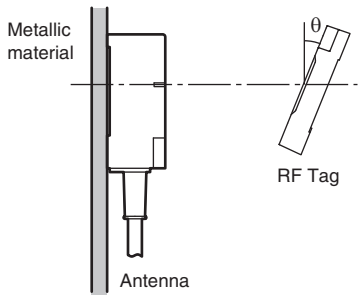
	RF Tag angle (θ°)									
	0	10	20	30	40	50	60	70	80	90
V680-HS63 and V680S-D8KF68M(Horizontal-facing RF Tag) (Metal on back: Steel)	0%	0%	0%	0%	0%	0%	0%	-5%	-14%	---
V680-HS63 and V680S-D8KF68M(Vertical-facing RF Tag) (Metal on back: Steel)	0%	-1%	-2%	-5%	-8%	-14%	-23%	-36%	---	---
V680-HS65 and V680S-D8KF68M(Horizontal-facing RF Tag) (Metal on back: Steel)	0%	-1%	-2%	-4%	-7%	-12%	-21%	-41%	---	---
V680-HS65 and V680S-D8KF68M(Vertical-facing RF Tag) (Metal on back: Steel)	0%	-1%	-3%	-6%	-12%	-20%	-32%	-59%	-65%	---

Measurement Conditions

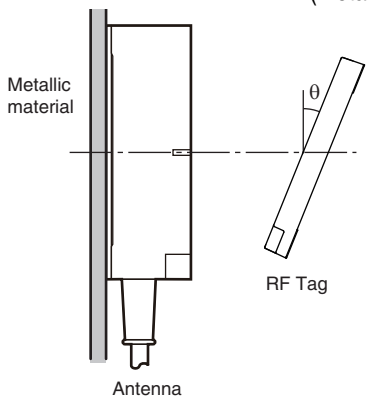
● V680-HS63 and V680S-D8KF68(Horizontal-facing RF Tag) (Metal on back: Steel)



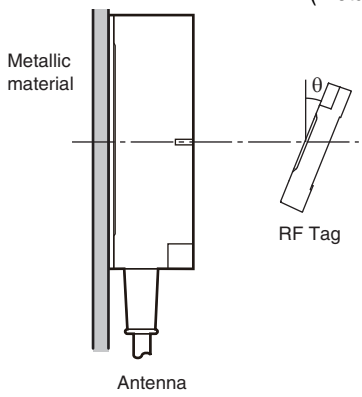
● V680-HS63 and V680S-D8KF68(Vertical-facing RF Tag) (Metal on back: Steel)



● V680-HS65 and V680S-D8KF68(Horizontal-facing RF Tag) (Metal on back: Steel)

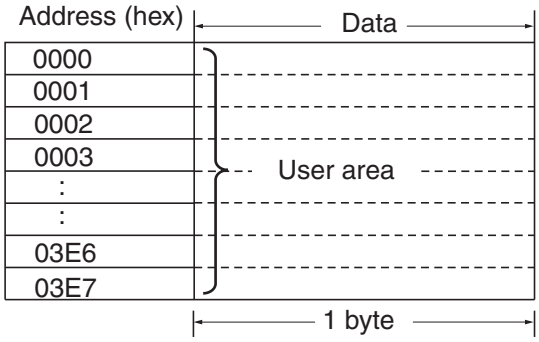


● V680-HS65 and V680S-D8KF68(Vertical-facing RF Tag) (Metal on back: Steel)



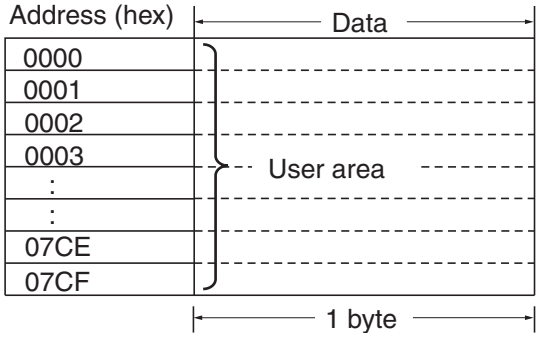
RF Tag Memory Map

V680-D1KP□□



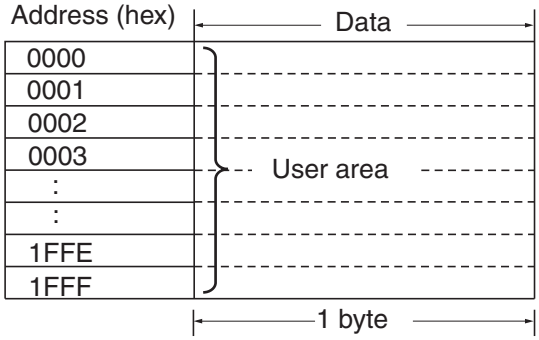
These RF Tags use EEPROM for memory. Including the write protection setting area, which is from 0000 to 0003 hex, the user can use a total of 1,000 bytes of space.

V680-D2KF□□ and V680S-D2KF6□



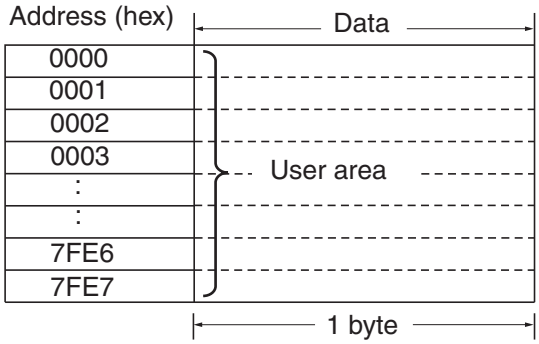
These RF Tags use FRAM for memory. Including the write protection setting area, which is from 0000 to 0003 hex, the user can use a total of 2,000 bytes of space.

V680-D8KF□□



These RF Tags use FRAM for memory. Including the write protection setting area, which is from 0000 to 0003 hex, the user can use a total of 8,192 bytes of space.

V680-D32KF□□

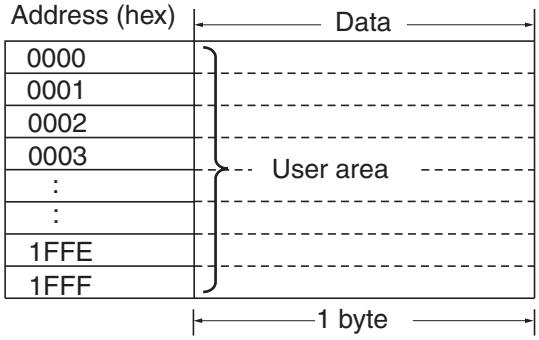


These RF Tags use FRAM for memory. Including the write protection setting area, which is from 0000 to 0003 hex, the user can use a total of 32,744 bytes of space.

CHECK!

RF Tag memory is 1 block of 8 bytes(□□□0 hex to □□□7 hex, □□□8 hex to □□□F hex).
The communication between RF Tag and the antenna of the V680/V680S series is a blocks described above.
There is a possibility to which data is mistaken with the block unit when the writing error occurs.
Write protection is set in the 4 bytes from RF Tag address 0000 to 0003 hex. Therefore, the write-protected data is written from 0004 hex or higher.

V680S-D8KF□□



These RF Tags use FRAM for memory. Including the write protection setting area, which is from 0000 to 0003 hex, the user can use a total of 8,192 bytes of space.

CHECK!

RF Tag memory is 1 block of 32 bytes(□□00 hex to □□1F hex, □□20 hex to □□3F hex, ···, □□E0 hex to □□FF hex).
The communication between RF Tag and the antenna of the V680/V680S series is a blocks described above.
There is a possibility to which data is mistaken with the block unit when the writing error occurs.
Write protection is set in the 4 bytes from RF Tag address 0000 to 0003 hex. Therefore, the write-protected data is written from 0004 hex or higher.

RF Tag Memory Capacities and Memory Types

(As of October 2014)

Model	Memory capacity (user memory)	Memory type	Life expectancy
V680-D1KP52MT V680-D1KP53M V680-D1KP66T V680-D1KP66MT V680-D1KP66T-SP	1,000 bytes	EEPROM	Write Endurance: 100,000 times per block (25°C) Data retention: 10 years after writing (85°C or less)
V680-D2KF52M	2,000 bytes	FRAM	Access frequency: 10 billion times Data retention: 10 years after writing (55°C or less)
V680-D8KF67 V680-D8KF67M V680-D8KF68	8,192 bytes		Access frequency: 10 billion times Data retention: 10 years after writing (70°C or less)
V680-D32KF68	32,744 bytes		
V680S-D2KF67 V680S-D2KF67M V680S-D2KF68 V680S-D2KF68M	2,000 bytes	FRAM	Access frequency: One trillion times Data retention: 10 years after writing (85°C or less)
V680S-D8KF67 V680S-D8KF67M V680S-D8KF68 V680S-D8KF68M	8,192 bytes		

Chemical Resistance of the Antennas and RF Tags

Chemical Resistance of the Antennas

■ Applicable Models

V680-HS51, V680-HS52-W/R, V680-HS63-W/R and V680-HS65-W/R

ABS resin is used for case material and epoxy resin for filling material. Refer to the following lists and do not use chemicals that affect ABS and epoxy resin.

▪ Chemicals That Cause Deformations, Cracks, Etc.

ABS resin	Epoxy resin
Trichlene, acetone, xylene, toluene, gasoline, creosol, methylene chloride, phenol, cyclohexane, aqua regia, chromic acid, sulfuric acid (90% RT), methyl ethyl ketone, aniline, nitrobenzine, monochlorobenzine, pyridine, nitric acid (60% RT), formic acid (80% RT)	Aqua regia, chromic acid, sulfuric acid (90% RT), nitric acid (60% RT), ammonia solution, acetone, methylene chloride, phenol

▪ Chemicals That May Cause Discoloration, Swelling, Etc.

ABS resin	Epoxy resin
Hydrochloric acid, alcohol, Freon, sodium hydroxide, hydrogen peroxide, benzine, sulfuric acid (10% RT), nitric acid (10% RT), phosphoric acid (85% RT), ammonia solution	Sulfuric acid (10% RT), nitric acid (10% RT), hydrochloric acid (30% RT), acetic acid (50% RT), oxalic acid, calcium hydroxide, benzine, creosol, alcohol, cyclohexane, toluene, xylene, benzine, grease

▪ Chemicals That Do Not Affect ABS Resin or Epoxy Resin

ABS resin	Epoxy resin
Ammonia, kerosine, mineral oil, developer, Yushiroken S50, Chemi-Cool Z, Velocity No. 3, Yushiroken EEE-30Y, petroleum, grease, acetic acid, oxalic acid, calcium hydroxide, phosphoric acid (30% RT), hydrochloric acid (10% RT), potassium hydroxide	Ammonia, hydrochloric acid (10% RT), potassium hydroxide, petroleum, gasoline, Yushiroken S50, Chemi-Cool Z, Velocity No. 3, Yushiroken EEE-30Y

Note: The above results are from tests conducted at room temperature (23°C). Even if the chemicals do not affect the ABS or epoxy resins at room temperature, they may affect the resins at higher or lower temperatures. Check the chemicals carefully in advance.

Chemical Resistance of RF Tags

■ Applicable Models

V680-D1KP52MT, V680-D1KP83M and V680-D2KF52M

PPS resin is used for case material and epoxy resin for filling material. Refer to the following lists and do not use chemicals that affect PPS and epoxy resin.
RF Tags cannot be used in applications with explosion-proof specifications.

▪ Chemicals That Cause Deformations, Cracks, Etc.

PPS resin	Epoxy resin
Aqua regia	Aqua regia, chromic acid, sulfuric acid (90% RT), nitric acid (60% RT), ammonia solution, acetone, methylene chloride, phenol

▪ Chemicals That May Cause Discoloration, Swelling, Etc.

PPS resin	Epoxy resin
Nitric acid (60% RT)	Sulfuric acid (10% RT), nitric acid (10% RT), concetrated hydrochloric acid, acetic acid (50% RT), oxalic acid, calcium hydroxide, benzine, creosol, alcohol, cyclohexane, toluene, xylene, benzine, grease

▪ Chemicals that Do Not Affect PPS Resin or Epoxy Resin

PPS resin	Epoxy resin
Hydrochloric acid (37%RT), sulfuric acid (98%RT), nitric acid (40%RT), hydrogen fluoride solution (40%RT), chromic acid (40%RT), hydrogen peroxide solution (28%RT), sodium hydroxide solution (60%RT), ammonia solution (28%RT), sodium chloride (10%RT), sodium carbonate (20%RT), sodium hypochlorite solution, phenol solution (5%RT), glacial acetic acid, acetic acid, oleic acid, methyl alcohol (95%RT), ethyl alcohol (95%RT), ethyl acetate, sebacic acid, diethylhexyl, acetone, diethyl ether, n-heptane, 2-2-4 trimethylpentane, benzine, toluene, aniline, mineral oil, gasoline, insulating oil, dichloroethylene, carbon tetrachloride	Ammonia, hydrochloric acid (10% RT), potassium hydroxide, petroleum, gasoline, Yushiroken S50, Chemi-Cool Z, Velocity No. 3, Yushiroken EEE-30Y, methyl ethyl ketone, sodium hydroxide (10%RT)

Note: The above results are from tests conducted a room temperature (23°C). Even if the chemicals do not affect the PPS or epoxy resins at room temperature, they may affect the resins at higher or lower temperatures. Check the chemicals carefully in advance.

■ Applicable Models

V680-D1KP66T, V680-D1KP66MT, V680S-D2KF67, V680S-D2KF67M, V680S-D2KF68, V680S-D2KF68M, V680S-D8KF67, V680S-D8KF67M, V680S-D8KF68, and V680S-D8KF68M

Chemical		At room temperature	90°C
Hydrochloric acid	37%	A	A
	10%	A	A
Sulfuric acid	98%	A	B
	50%	A	A
	30%	A	A
	3%	A	A
Nitric acid	60%	B	C
	40%	A	B
	10%	A	A
Hydrogen fluoride solution	40%	A	A
Chromic acid	40%	A	A
Hydrogen peroxide solution	28%	A	B
	3%	A	A
Sodium hydroxide solution	60%	A	A
	10%	A	A
	1%	A	A
Ammonia solution	28%	A	B
	10%	A	B
Sodium chloride	10%	A	A
Sodium carbonate	20%	A	A
	2%	A	A

Chemical		At room temperature	90°C
Sodium hypochlorite solution		A	A
Phenol solution	5%	A	A
Glacial acetic acid		A	A
Acetic acid		A	A
Oleic acid		A	A
Methyl alcohol	95%	A	A
Ethyl alcohol	95%	A	A
Ethyl acetate		A	A
Sebacic acid diethylhexyl		A	A
Acetone		A	A
Diethyl ether		A	A
n-heptane		A	A
2-2-4 trimethylpentane		A	A
Benzene		A	A
Toluene		A	A
Aniline		A	A
Mineral oil		A	A
Gasoline		A	A
Insulating oil		A	A
Dichloroethylene		A	A
Carbon tetrachloride		A	A

A: Has no adverse effect, B: May cause discoloration, swelling, etc., C: Causes deformation, cracks, etc.

CHECK!

The above table shows the extent of changes in PPS resin exposed to each chemical at room temperature and at 90°C. If actual chemicals, concentrations, and temperatures are different from those shown in the tables, always conduct tests under the actual conditions in which the RF Tags are to be used.

■ Applicable Models

V680-D1KP66T-SP

PFA is used for the V680-D1KP66T-SP RF Tag coating.
Refer to the following materials and check the characteristics before using them.

▪ Chemical Resistance of PFA Fluororesin (Reference Material)

PFA: Tetrafluorethylene-Perfluoroalkylvinyletheir copolymer

PFA fluororesin is non-reactive to most chemicals.
It reacts to alkaline metals in the melted state, F2 (fluorine) under high temperature and high pressure, and some halogen derivatives.
The results testing by immersing the PFA material in commonly used organic and inorganic chemicals are shown below. This testing involves placing a compression molded test piece (1.3-mm thickness) in the chemicals at room temperature for one week (168 hours), then removing it to measure the change in weight, tensile strength, and stretch. If the change in tensile strength is less than 15%, elasticity is less than 10%, and weight is less than 0.5%, the effect is considered minimal.
When fluids that wet the resin surface, such as trichloroacetic acid, Tri-n-butylamine hydrofluoride, perchloroethylene, and carbon tetrachloride, are applied at high temperatures, it is likely that the PFA will increase weight by absorption and lose its tensile strength. Even if chemicals that are solvents are absorbed, the molecular structure will not change. If the PFA is subject to deformation at high temperatures, deformation at high pressures, or other physical damage, the absorbed chemicals will repeatedly expand and contract within the PFA, causing physical defects such as cracks or blistering. However, these are problems that are likely to occur with any type of plastic.

Inorganic Chemicals

Chemical	Test temperature (°C)	Residual characteristic (%)		Weight gain (%)
		Tensile strength	Stretch	
Concentrated hydrochloric acid	120	98	100	0.0
Concentrated sulfuric acid	120	95	98	0.0
Hydrofluoric acid (60%RT)	23	99	99	0.0
Fuming sulfuric acid	23	95	96	0.0
Aqua regia	120	99	100	0.0
Chromic acid (50% RT)	120	93	97	0.0
Concentrated nitric acid	120	95	98	0.0
Fuming nitric acid	23	99	99	0.0
66	98	100	100	0.0
Caustic soda (50% RT)	120	93	99	0.4
Hydrogen peroxide solution (30% RT)	23	93	95	0.0
Bromine	23	99	100	0.0
Chlorine	120	92	100	0.5
Ferrous chloride (25% RT)	100	93	98	0.0
Zinc chloride (25% RT)	100	96	100	0.0
Sulfuryl chloride	69	83	100	2.7
Chlorosulfonic acid	151	91	100	0.0
Concentrated phosphoric acid	100	93	100	0.0

Organic Chemicals

Chemical	Test temperature (°C)	Residual characteristic (%)		Weight gain (%)
		Tensile strength	Stretch	
Water-acetic acid	118	95	100	0.4
Acetic anhydride	139	91	99	0.3
Trichloroacetic acid	196	90	100	2.2
Isooctane	99	94	100	0.7
Naphtha	100	91	100	0.5
Mineral oil	180	87	95	0.0
Toluene	110	88	100	0.7
o-Creosol	191	92	96	0.2
Nitrobenzene	210	90	100	0.7
Benzyl alcohol	205	93	99	0.3
Aniline	185	94	100	0.3
n-Butylamine	78	86	97	0.4
Ethylenediamine	117	96	100	0.1
Tetrahydrofuran	66	88	100	0.7
Benzaldehyde	179	90	99	0.5
Cyclohexane	156	92	100	0.4
Methyl ethyl ketone	80	90	100	0.6
Acetophenone	202	90	100	0.6
Dimethylphtalate	200	98	100	0.3
n-Butyl acetate	125	93	100	0.5
Tri-n-butyl phosphate	200	91	100	2.0
Methylene chloride	40	94	100	0.8
Perchloroethylene	121	86	100	2.0
Carbon tetrachloride	77	87	100	2.3
Dimethyl formamide	154	96	100	0.2
Dimethyl sulfoxide	189	95	100	0.1
Dioxane	101	92	100	0.6

Reference: Satokawa Takaomi, Fluoro-resin Handbook, Nikkan Kogyo Shimbun Ltd.

■ Applicable Models

V680-D8KF67, V680-D8KF67M, V680-D8KF68 and V680-D32KF68

Chemicals that affect RF Tags are shown below.
Polybutylene terephthalate (PBT) resin is used for case material and epoxy resin for filling material.
Refer to the following lists and do not use chemicals that affect PBT and epoxy resins.
RF Tags cannot be used in applications with explosion-proof specifications.

▪ Chemicals That Cause Deformations, Cracks, Etc.

PBT resin	Epoxy resin
Acetone, trichloroethylene, ethylene dichloride, sodium hydroxide, and other alkaline substances	Aqua regia, chromic acid, sulfuric acid (90% RT), nitric acid (60% RT), liquid ammonia, acetone, methylene chloride, phenol

▪ Chemicals That May Cause Discoloration, Swelling, Etc.

PBT resin	Epoxy resin
Hydrochloric acid (10% RT), acetic acid (5% RT), benzene	Sulfuric acid (10% RT), nitric acid (10% RT), concentrated hydrochloric acid, acetic acid (50% RT), oxalic acid, calcium hydroxide, benzene, cresol, alcohol, microhexanon, toluene, xylene, benzene, grease

▪ Chemicals that Do Not Affect PPS Resin or Epoxy Resin

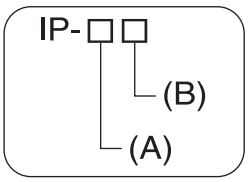
PBT resin	Epoxy resin
Nitric acid (30% RT), concentrated hydrochloric acid, acetic acid, ethyl acetate (100% RT), potassium permaganate (5% RH), ethyl acetate, carbon tetrachloride, methanol, ethanol, gasoline	Ammonia, hydrochloric acid (10% RT), potassium hydrate, petroleum, gasoline, Yushiroken S50, Chemi-cool Z, Velocity No. 3, Yushiroken EEE-30Y, methyl ethyl ketone, sodium hydroxide (10% RH)

Note: The above results are from tests conducted at room temperature (23°C). Even if the chemicals do not affect the PPS or epoxy resins at room temperature, they may affect the resins at higher or lower temperatures. Check the chemicals carefully in advance.

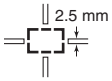
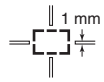
Degree of Protection

Ingress protection degrees (IP-□□) are determined by the following tests. Be sure to check the sealing capability under the actual operating environment and conditions before actual use.

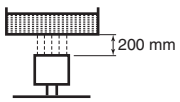
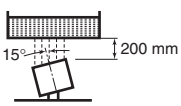
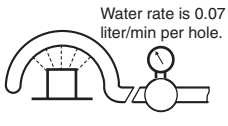
■ IEC (International Electrotechnical Commission) Standards
IEC 60529: 2001

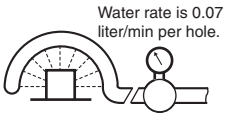
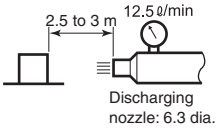
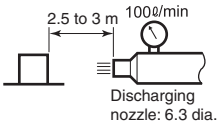
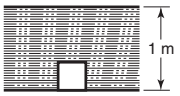


(A) First Digit: Degree of Protection from Solid Materials

Degree	Protection	
0		No protection
1		Protects against penetration of any solid object such as a hand that is 50 mm or more in diameter.
2		Protects against penetration of any solid object, such as a finger, that is 12.5 mm or more in diameter. Even if finger or other object 12 mm in diameter penetrates, it will not reach a hazardous part.
3		Protects against penetration of any solid object, such as a wire, that is 2.5 mm or more in diameter.
4		Protects against penetration of any solid object, such as a wire, that is 1 mm or more in diameter.
5		Protects against penetration of dust of a quantity that may cause malfunction or obstruct the safe operation of the product.
6		Protects against penetration of all dust.

(B) Second Digit: Degree of Protection Against Water

Degree	Protection		Test method (with pure water)	
0	No protection	Not protected against water.	No test	
1	Protection against water drops	Protects against vertical drops of water towards the product.	Water is dropped vertically towards the product from the test machine for 10 min.	
2	Protection against water drop	Protects against drops of water approaching at a maximum angle of 15° to the left, right, back, and front from vertical towards the product.	Water is dropped for 2.5 min each (i.e., 10 min in total) towards the product inclined 15° to the left, right, back, and front from the test machine.	
3	Protection against sprinkled water	Protects against sprinkled water approaching at a maximum angle of 60° from vertical towards the product.	Water is sprinkled for 10 min at a maximum angle of 60° to the left and right from vertical from the test machine.	

Degree	Protection		Test method (with pure water)
4	Protection against water spray	Protects against water spray approaching at any angle towards the product.	Water is sprayed at any angle towards the product for 10 min from the test machine. 
5	Protection against water jet spray	Protects against water jet spray approaching at any angle towards the product.	Water is jet sprayed at any angle towards the product for 1 min per square meter for at least 3 min in total from the test machine. 
6	Protection against high pressure water jet spray	Protects against high-pressure water jet spray approaching at any angle towards the product.	Water is jet sprayed at any angle towards the product for 1 min per square meter for at least 3 min in total from the test machine. 
7	Protection underwater	Resists the penetration of water when the product is placed underwater at specified pressure for a specified time.	The product is placed 1 m deep in water (if the product is 850 mm max. in height) for 30 min. 
8 (See note.)	Protection underwater	Can be used continuously underwater.	The test method is determined by the manufacturer and user.

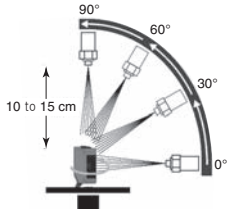
Note: OMRON Test Method

Usage condition: 10 m or less under water in natural conditions

1. No water ingress after 1 hour under water at 2 atmospheres of pressure.
2. Sensing distance and insulation resistance specifications must be met after 100 repetitions of half hour in 5°C water and half hour in 85°C water.

About IPX9K

IPX9K is a protection standard regarding high temperature and high-pressure water which is defined by the German standard (DIN 40050 PART9).
Water is sprayed on 80 °C hot water with the water pressure of 80 to 100BAR from a nozzle to the test piece.
Amount of water is 14 to 16 liters/minute.
The distance between the test piece and a nozzle is 10 to 15 cm, and the directions of water-drainage are 0 degrees, 30 degrees, 60 degrees, and 90 degrees horizontally.
They are evaluated with the test piece is rotating on a horizontal plane by 30 seconds in each direction.



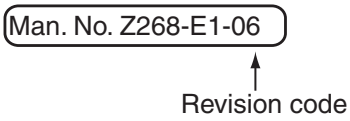
■ Oil Resistance (OMRON in-house standard)

Protection	
Oil-resistant	No adverse affect from oil drops or oil spray approaching from any direction.
Oil-proof	Protects against penetration of oil drops or oil spray approaching from any direction.

Note. Oil resistance has been tested using a specific oil as defined in the OMRON test method. (JIS C 0920:2003, Appendix 1)

Revision History

A manual revision code appears as a suffix to the catalog number at the bottom of the front and rear pages.



Revision code	Date	Revised contents
01	September 2007	Original production
02	September 2008	Added information on international standards and conforming standards. Changed output signal names for V680-HAM42-FRT and dielectric strength specifications. Added information on RF Tag service life warning management. Made other minor revisions.
03	May 2010	Added item for V680-HS51/-HS52/-HS63/-HS65 Antennas, and V680-D1KP52MT/-D1KP53M/-D1KP66T/-D1KP66MT/-D2KF52M/-D2KF67/-D2KF67M/-D8KF67/-D8KF67M/-D8KF68/-D32KF68 RF Tags, and mode other minor corrections.
04	November 2013	Added information on E-paper label mode. Made other minor revisions.
05	February 2014	Added items for V680S-D2KF67/-D2KF67M/-D2KF68/-D2KF68M RF Tags. Deleted items for V680-D2KF67 RF Tags. and made other minor corrections.
05A	April 2014	The dimensions of V680S-D2KF67/-D2KF67M/-D2KF68/-D2KF68M is changed.
06	October 2014	Added items for V680S-D8KF67/-D8KF67M/-D8KF68/-D8KF68M RF Tags. and made other minor corrections.

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